

EXHIBIT A

Pedophilia, Hebephilia, and the *DSM-V*

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Abstract The term *pedophilia* denotes the erotic preference for prepubescent children. The term *hebephilia* has been proposed to denote the erotic preference for pubescent children (roughly, ages 11 or 12–14), but it has not become widely used. The present study sought to validate the concept of hebephilia by examining the agreement between self-reported sexual interests and objectively recorded penile responses in the laboratory. The participants were 881 men who were referred for clinical assessment because of paraphilic, criminal, or otherwise problematic sexual behavior. Within-group comparisons showed that men who verbally reported maximum sexual attraction to pubescent children had greater penile responses to depictions of pubescent children than to depictions of younger or older persons. Between-groups comparisons showed that penile responding distinguished such men from those who reported maximum attraction to prepubescent children and from those who reported maximum

attraction to fully grown persons. These results indicated that hebephilia exists as a discriminable erotic age-preference. The authors recommend various ways in which the *DSM* might be altered to accommodate the present findings. One possibility would be to replace the diagnosis of Pedophilia with Pedohebephilia and allow the clinician to specify one of three subtypes: Sexually Attracted to Children Younger than 11 (Pedophilic Type), Sexually Attracted to Children Age 11–14 (Hebephilic Type), or Sexually Attracted to Both (Pedohebephilic Type). We further recommend that the *DSM-V* encourage users to record the typical age of children who most attract the patient sexually as well as the gender of children who most attract the patient sexually.

Keywords *DSM-V* · Ephebophilia · Hebephilia · Paraphilia · Pedophilia · Penile plethysmography · Phallometry · Sexual offending · Sexual orientation · Teleiophilia

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Introduction

The *DSM-IV-TR* (American Psychiatric Association, 2000) defines *pedophilia* as the erotic preference for prepubescent children. A substantial body of evidence indicates that this definition, if taken literally, would exclude from diagnosis a sizable proportion of those men whose strongest sexual feelings are for physically immature persons. Before we present this evidence, we will first consider the classification of children as pubescent or prepubescent.

The average age of menarche for American Caucasian females is 12.9 years (Herman-Giddens et al., 1997). There are various other indicators of pubertal onset, however, which usually appear before menarche. In females, the first stage of pubic hair development (sparse growth along the

labia) appears at an average age of 11.0 years, and the first stage of breast development (breast buds) at 11.2 years (Roche, Wellens, Attie, & Siervogel, 1995). In males, the first stage of pubic hair development (sparse growth at the base of the penis) appears at 11.2 years, and the first pubertal changes to the penis and testes (e.g., changes in texture and coloration of the scrotal skin) also at 11.2 years (Roche et al., 1995). In females, adult-pattern pubic hair (inverse triangle spreading to the thighs) appears at 13.1–15.2 years, according to different studies, and adult-type breasts (projection of the papillae only, after recession of the areolae) develop at 14.0–15.6 years (Grumbach & Styne, 1998, Table 31-2). In males, adult-pattern pubic hair (inverse triangle spreading to the thighs) appears at 14.3–16.1 years, and the genitalia attain adult size and shape at 14.3–16.3 years (Grumbach & Styne, 1998, Table 31-4). The pubertal growth spurt in height begins around age 10 in females and age 12 in males; it ends around age 15 in females and age 17 in males (Grumbach & Styne, 1998, Fig. 31-11). In summary, pubescent children are generally those from age 11 or 12 years to about 14 or 15; prepubescent children are those who are younger.

The modal age of victims of sexual offenses in the United States is 14 years (Snyder, 2000, Fig. 1; Vuocolo, 1969, p. 77), therefore the modal age of victims falls within the time-frame of puberty. In anonymous surveys of social organizations of persons who acknowledge having an erotic interest in children, attraction to children of pubescent ages is more frequently reported than is attraction to those of prepubescent ages (e.g., Bernard, 1975; Wilson & Cox, 1983). In samples of sexual offenders recruited from clinics and correctional facilities, men whose offense histories or assessment results suggest erotic interest in pubescents sometimes outnumber those whose data suggest erotic interest in prepubescent children (e.g., Cantor et al., 2004; Gebhard, Gagnon, Pomeroy, & Christenson, 1965; Studer, Aylwin, Clelland, Reddon, & Frenzel, 2002). The foregoing findings are consistent with the results of large-scale surveys that sampled individuals from the general population and included questions regarding sexual experiences with older persons when the respondent was underage. These results suggest that a substantial proportion of respondents who had had such experiences reported ages at occurrence that fall within the normal time-frame of puberty (Boney-McCoy & Finkelhor, 1995; Briere & Elliott, 2003; Finkelhor, Ormrod, Turner, & Hamby, 2005). The precise proportion, however, cannot be calculated from the published data.

The existence of men whose erotic interest centers on pubescents has not, of course, been totally ignored. Glueck (1955) coined the term *hebephiles* to refer to them. This term has not come into widespread use, even among professionals who work with sex offenders. One can only speculate why not. It may have been confused with the term *ephebophiles*, which denotes men who prefer adolescents around 15–

19 years of age (Krafft-Ebing & Moll, 1924). Few would want to label erotic interest in late- or even mid-adolescents as a psychopathology, so the term hebephilia may have been ignored along with ephebophilia.

A second possible reason why the term hebephilia has not become more common has to do with female reproductive physiology. The temporally discrete and developmentally unique event of menarche seems to divide females naturally into two classes; thus, the obvious distinction among men is between those who prefer females before their first menses and those who prefer females who have passed this milestone. Such a division is consistent with various cultural and religious attitudes towards menarche. It would also appear consistent with an evolutionary psychology position that the adaptive partner-preference is for fecund females (although females are actually subfecund for 1–2 years after menarche; Wood, 1994, p. 407). In any event, this distinction may have more to do with the ideological meaning of menarche for the labelers than with the erotic preferences of the man being labeled. From the man's point of view, the sexual attractiveness of a girl one year after menarche (e.g., age 14) may equal that of a girl one year before menarche (e.g., 12), not that of a girl five years after menarche (e.g., 18).

A third possible reason for the disuse of hebephilia is a general resistance or indifference to the adoption of a technical vocabulary for erotic age-preferences. There may be as many mental health professionals who have heard of "granny porn" as have heard of *gerontophilia* (the erotic preference for the aged), although the term gerontophilia was introduced at least 80 years ago (Hirschfeld, 1920). It is only a few years since anyone finally proposed a term—*teleiophilia*—to denote the erotic preference for persons between the ages of physical maturity and physical decline (Blanchard et al., 2000), even though the word *normal* has been effectively off-limits for describing erotic interests for decades.

Several studies have demonstrated the utility of specifying a hebephilic group, at least for research purposes. These studies have compared pedophilic, hebephilic, and teleiophilic men on a variety of dependent measures. The results have shown hebephiles to be intermediate between pedophiles and teleiophiles with regard to IQ (Blanchard et al., 2007; Cantor et al., 2004), completed education (Blanchard et al., 2007), school grade failure and special education placement (Cantor et al., 2006), head injuries before age 13 (Blanchard et al., 2003), left-handedness (Blanchard et al., 2007; Cantor et al., 2005), and stature (Cantor et al., 2007).

The finding that the groups designated "hebephiles" were intermediate in IQ, handedness, and so on, is consistent with the notion that they were also intermediate in their erotic preference, but it does not prove it. The designated hebephilic groups might simply have been a mixture of pedophiles and teleiophiles; in that case, one would also expect to observe

intermediate values on all these dependent measures. What is needed to establish hebephilia as a legitimate diagnostic entity is convergence between two or more lines of evidence bearing directly on a man's sexual interest in children, pubescents, and adults.

The present study sought to validate the concept of hebephilia by examining the agreement between self-reported and psychophysiological assessed erotic responses. Psychophysiological assessment consisted of phallometric testing, an objective technique for quantifying erotic interests in human males. In phallometric tests for gender and age preference, the individual's penile blood volume is monitored while he is presented with a standardized set of laboratory stimuli depicting male and female children, pubescents, and adults. Increases in the examinee's penile blood volume (i.e., degrees of penile erection) are taken as an index of his relative attraction to different classes of persons.

Our specific research questions were straightforward: Do men who report maximum sexual attraction to pubescent children have greater penile responses, in the laboratory, to depictions of pubescent children than to depictions of younger or older persons? Can such men be distinguished from those who report maximum attraction to prepubescent children, on the one hand, and from those who report maximum attraction to fully grown persons, on the other? Positive answers to these questions would argue for the recognition of hebephilia as a clinically and perhaps theoretically significant erotic preference. They would also imply that the current *DSM* definition of pedophilia is excluding from specific diagnosis a considerable proportion of men who have a persistent preference for humans at an incomplete stage of physical development. In contrast, negative answers would suggest that the hebephilic groups studied in previous investigations have merely been mixtures of pedophiles and teleiophiles, and that this explains why the hebephiles' results (for IQ, handedness, and so on) were intermediate between those of homogeneously classified pedophiles and teleiophiles. Negative results would moreover indicate that the *DSM* diagnosis of Paraphilia Not Otherwise Specified is probably adequate for the diagnosis of many men who do not quite satisfy the *DSM* criteria for Pedophilia.

The research design sketched above is simple in principle but challenging in practice. The great majority of men with an erotic preference for children deny this to mental health professionals and researchers, as they do to police, lawyers, and judges. Perhaps 40% of "nonadmitting" pedophiles (and hebephiles) are able to manipulate their phallometric test outcomes sufficiently to avoid a diagnosis of pedophilia (e.g., Blanchard, Klassen, Dickey, Kuban, & Blak, 2001). It is likely that many nonadmitters who fail to avoid a diagnosis of pedo- or hebephilia nonetheless distort their phallometric data somewhat in the attempt. Thus, nonadmitting pedophiles (and hebephiles) are not useful for theoretical studies like the present one, which depend on high-quality phallometric data from cooperative

participants. The present study was possible because the very large volume of assessments carried out at the authors' clinic enabled us to collect, over an 11-year period, a sufficient number of men who acknowledged an erotic preference for persons at some level of physical immaturity.

Method

Participants

Between August 1995 and April 2006, 2,868 male patients were referred to the Kurt Freund Laboratory of the Centre for Addiction and Mental Health (Toronto, Ontario, Canada) because of paraphilic, criminal, or otherwise problematic sexual behavior. The purpose of these referrals was to determine what kinds of sexual partners (or sexual victims) and what kinds of sexual activities were most arousing to these individuals. The assessment usually included testing for erotic age-preference (pedophilia, hebephilia, teleiophilia), even when the presenting problem did not involve offenses against children. That is because paraphilias tend to cluster, and because men who present with no known sexual offenses or offenses solely against adults sometimes prove to have an erotic preference for the immature phenotype. The identical phallometric test for erotic age-preference was administered to 2,591 of these men; this test also assessed their erotic gender-preference (Blanchard et al., 2001).

Excluded from eligibility for the study were 191 men whose phallometric test results were spoiled by technical problems or whose responses were too low (see later), 58 men whose sexual history information was incomplete or had not yet been computerized at the time of the data retrieval, and 38 men who did not give consent for their clinical assessment data to be used for research purposes. The initial pool of potential patient participants therefore included 2,304 men, with a mean age of 37.75 years ($SD = 13.24$ years), and a median education level of Grade 12.

The sources of the referrals included parole and probation officers, prisons, defense lawyers, various institutions (ranging from group homes for mentally retarded persons to regulatory bodies for health or educational professionals), and physicians in private practice. As would be expected from the preponderance of criminal justice sources, the majority of patients had one or more sexual offenses. The phrase *sexual offenses*, in this article, includes charges, convictions, credible accusations, and self-disclosures of criminal sexual behavior. *Credible accusations* were defined by default, that is, all accusations excepting those that were made by an individual who stood to gain in some way from criminal charges against the accused, that had no corroborating evidence, and that were not voiced at the time the alleged offense or offenses occurred. Only a small proportion of accusations were not considered

credible; typical examples were allegations, not followed by criminal charges, from estranged spouses in child custody-and-access disputes.

The patient pool comprised approximately 10% men with no known sexual offenses; 10% with offenses involving the possession, distribution, or manufacture of child pornography; 18% with offenses against children age 5 or younger; 39% with offenses against children age 6–10; 12% with offenses against children age 11; 32% with offenses against pubescents age 12–14; 15% with offenses against teenagers age 15–16; and 27% with offenses against adults age 17 or older. These percentages add up to more than 100%, because many patients had offenses in more than one category. Offenses against adult victims included some that involved physical contact (e.g., rape, frotteurism) and others that did not (e.g., exhibitionism, voyeurism, obscene telephone calling). Men who had no involvement with the criminal justice system and who initiated referrals through their physicians included patients who were unsure about their sexual orientation, patients concerned about hypersexuality or “sex addiction,” patients experiencing difficulties because of their excessive use of telephone sex lines or massage parlors, clinically obsessional patients with intrusive thoughts about unacceptable sexual behavior, and patients with paraphilic behaviors like masochism, fetishism, and transvestism.

Added to the initial pool of 2,304 patients were 51 men with criminal offenses of a nonsexual nature, who were not patients but paid research volunteers (Cantor et al., 2008). They were included because they had all the same data as the patients; because there was no reason to exclude them, given the goals of the study; and because some of them reported pedophilia or homosexuality, although they had not been recruited on that basis. Thus, the total number of potential participants was 2,355.

Materials and Measures

Sexual History

A standardized form, which has been employed in the Kurt Freund Laboratory since 1995, was used to record the patient's history of sexual offenses. Most of that information came from objective documents that accompanied his referral, for example, reports from probation and parole officers. The offense-history data were cross-checked against, and supplemented by, information provided by the patient himself. This included the number and nature of any additional sexual offenses that were admitted by the patient but for which he was never charged. The patient's information was solicited by the laboratory manager in a structured interview, which was conducted, in the great majority of instances, immediately before phallometric testing.

The patient's sexual history was quantified and recorded using a large number of predetermined categories, some pertaining to the gender and ages of his sexual victims (if any) and others pertaining to the nature of his criminal or other sexual activities (e.g., indecent exposure, rape, consenting intercourse). Of present relevance were the patient's numbers of female victims in six age-ranges—5 and younger, 6–10, 11, 12–14, 15–16, and 17 or older—and his numbers of male victims in the same six age-ranges. The numbers of female and male victims 11 years of age were recorded as separate variables because it was unclear at the time that the structured interview and its companion database were designed whether children of this age should be classed with younger children as prepubescent or with older children as pubescent. Also recorded as separate variables were the patient's criminal charges and self-admissions regarding the use, manufacture, or distribution of child pornography.

Self-Report of Erotic Preferences

The interviewer recorded the patient's self-reported sexual interest in other persons, using 12 separate variables: the patient's degree of sexual interest in females age 5 or younger, 6–10, 11, 12–14, 15–16, and 17 or older, and in males in the same six age-ranges. In some cases, this required a great deal of exploration: “Are you more attracted to adults or to children?” “Are you more attracted to boys or to girls?” “Are you more attracted to girls before they commence puberty or after they have entered puberty?” “Do you find 11-year-old girls more attractive than 14-year-old girls, less attractive, or equally attractive?” “Do you feel any interest at all in 11-year-old boys?” In many instances, however, the process was relatively brief and straightforward, because the patient stated that his primary sexual interest was in females age 17 or older, sometimes with a lesser degree of attraction to females age 15–16, and that he had no attraction to females under the age of 15 or to males of any age.

The interviewer quantified the patient's self-reported sexual interest in each of the 12 gender-age categories, using a rating from 1 to 5. A rating of 5 indicated that persons of a given gender and age (e.g., males age 15–16 years) stimulated as much sexual interest as the participant was capable of feeling (toward another person). A rating of 1 indicated that the participant felt no sexual attraction for persons of that age and gender. If the patient was willing and able to discriminate multiple levels of sexual attraction, ratings of 2, 3, and 4 were used to record middling levels of erotic interest. Any given rating-number could be used for more than one gender-age category. A patient who reported an erotic preference for pubescent males, for example, might get ratings of 5 for 11-year-old boys and for 12–14 year-old boys and ratings of 4 for 6–10 year-old boys and for 15–16 year-old boys. This complicated method of assessing

erotic age-preference was used because its original purpose in the structured interview was not to pinpoint the age or physical maturation of persons for whom the participant reported the strongest attraction, but rather to assess whether—or to what extent—he admitted an erotic interest in persons of the same chronological age and gender as his known sexual victims.

Phallometric Apparatus

All participants in this study underwent the standard testing procedures of the Kurt Freund Laboratory. The Laboratory is equipped for volumetric plethysmography, that is, the apparatus measures penile blood volume change rather than penile circumference change. The volumetric method measures penile tumescence more accurately at low levels of response (Kuban, Barbaree, & Blanchard, 1999). A photograph and schematic drawing of the volumetric apparatus are given in Freund, Sedlacek, and Knob (1965). The major components include a glass cylinder that fits over the penis and an inflatable cuff that surrounds the base of the penis and isolates the air inside the cylinder from the outside atmosphere. A rubber tube attached to the cylinder leads to a pressure transducer, which converts air pressure changes into voltage output changes. Increases in penile volume compress the air inside the cylinder and thus produce an output signal from the transducer. The apparatus is calibrated so that known quantities of volume displacement in the cylinder correspond to known changes in transducer voltage output. The apparatus is very sensitive and can reliably detect changes in penile blood volume below the threshold of subjective awareness.

Phallometric Procedure

The participant placed the glass cylinder over his penis, according to instructions from the test administrator. He then sat in a reclining chair, which faced three adjacent projection screens, and put on a set of headphones. After the set-up was complete, the participant's lower body was covered with a sheet to minimize his embarrassment or discomfort. During the test, the participant's face was monitored with a low-light video camera, in order to monitor stimulus avoidance strategies such as closing the eyes or averting them from the test stimuli.

The phallometric test used in this study has been described in detail elsewhere (Blanchard et al., 2001, 2007). The stimuli were audiotaped narratives presented through the headphones and accompanied by slides shown on the projection screens. There were seven categories of narratives, which described sexual interactions with prepubescent girls, pubescent girls, adult women, prepubescent boys, pubescent boys, and adult men, and also solitary, nonsexual activities ("neutral" stimuli). All narratives were written in the second person and present

tense and were approximately 100 words long. The scripts of sample narratives have been reproduced in previous articles (Blanchard et al., 2001, 2007). The narratives describing heterosexual interactions were recorded with a woman's voice, and those describing homosexual interactions, with a man's. Neutral stimuli were recorded with both.

Each test trial consisted of one narrative, accompanied by photographic slides on the three adjacent screens, which simultaneously showed the front view, rear view, and genital region of a nude model who corresponded in age and gender to the topic of the narrative. In other words, a narrative describing sex with an adult man would be accompanied by multiple images of nude adult men. A photograph that illustrates how the models were posed for the full frontal view may be found in Blanchard et al. (2007). The neutral narratives (e.g., "You climb down into the small rowboat, untie it, and push off from the dock with an oar...") were accompanied by slides of landscapes.

Each trial included three different models, each presented for 18 s. Therefore the total duration of a trial was 54 s, during which the participant viewed a total of nine slides, three at a time. For example, in a stimulus trial depicting physically mature females, the participant would hear one narrative describing sex with an adult woman, while he viewed photographs of woman A from three angles, followed by woman B from three angles, followed by woman C from three angles.

The full test consisted of four blocks of seven trials, with each block including one trial of each type in fixed, pseudorandom order. Although the length of the trials was fixed, the interval between trials varied, because penile blood volume was required to return to its baseline (flaccid) value before a new trial was started. The time required to complete a test was usually about 1 h.

Phallometric Stimuli

The narratives depicting sexual interaction with prepubescent children and pubescent children explicitly stated the age of the fictional child at the beginning of the script, for example, "You are babysitting a five-year-old girl for the evening. She is taking a bath before she gets ready for bed. Through the open bathroom door, she calls you to come in and scrub her back..." In the narratives about prepubescent children, the ages of the fictional children were variously stated as 5–9 years. In the narratives about pubescent children, the ages were given as 11–13 years. The narratives describing interaction with adult men and women did not state the age of the fictional sexual partner, although they were clearly portrayed as adults. There was no relation between the various activities described in the narratives and the uniform, static poses of the simultaneously presented models.

The original set of photographic models on which the present test was based comprised prepubescent girls age 5–

11, pubescent girls 12–14, adult women 22–26, prepubescent boys 5–11, pubescent boys 12–14, and adult men 19–25 (Freund, Langevin, Cibiri, & Zajac, 1973; Freund, McKnight, Langevin, & Cibiri, 1972). There have been some additions or substitutions of models in the intervening years, primarily involving the adults. The new models extended the ages of the prepubescent girls to 3–11 years, the ages of the adult women to 20–35 years, and the ages of the adult men to 19–41 years.

Because of the central importance of the pubescent stimuli in this study, the physical maturity of the photographic models was rated by one of the authors (D.W.), a pediatric endocrinologist, and the results are presented below. The rating system used the stages of sexual development originally identified by Tanner (1978). Tanner stages pertain to breast development and pubic hair growth in females, and to genital development and pubic hair growth in males. Tanner stages are rated from 1 (prepubertal) to 5 (fully mature), according to established criteria. Breast development and pubic hair growth are not always perfectly correlated in females, and genital development and pubic hair growth are not always perfectly correlated in males; therefore Tanner stages are rated separately for each feature.

According to Marshall and Tanner (1969), the criteria for female breast development are as follows: stage 1—prepubescent, projection of the papilla only; stage 2—breast bud stage, elevation of breast, papilla as a small mound, enlargement of areolar diameter; stage 3—further enlargement of breast and areola with no separation of their contours; stage 4—projection of areola and papilla to form a secondary mound above the level of the breast; and stage 5—mature stage, projection of papilla only, areola recessed to the general contour of the breast. The genital development stages for males (Marshall & Tanner, 1970) are as follows: stage 1—prepubescent, genitals are about the same size and proportion as in early childhood; stage 2—scrotum and testes have enlarged, scrotal skin shows a change in color and texture; stage 3—growth of the penis in length and girth, further growth of testes and scrotum; stage 4—penis is further enlarged, development of the glans; and stage 5—genitalia are adult in size and shape. With regard to both female and male pubic hair growth, the Tanner stages are as follows: stage 1—prepubescent, no pubic hair; stage 2—sparse growth of long, slightly pigmented downy hair, appearing mainly along the labia or base of the penis; stage 3—hair is darker and coarser, spreads over the junction of the pubes; stage 4—hair is adult in type, but area covered still significantly less than in a mature adult; and stage 5—hair is adult in type and quantity and distributed in an inverse triangle.

With only a few exceptions (one boy used as a prepubescent stimulus had Tanner stage 2 genitals and another had Tanner stage 2 pubic hair), all the prepubescent children were rated as Tanner stage 1's, and all the adults were rated as

Tanner stage 5's, for all body regions. The mean Tanner stage for the breasts of the pubescent girls was 2.67 (SD = 1.03, range, 2–4), and the mean Tanner stage for their pubic hair growth was 2.33 (SD = 0.82, range, 1–3). The corresponding Tanner stages for the pubescent boys were as follows: genital development, mean of 3.83 (SD = 0.75, range, 3–5), and pubic hair growth, mean of 3.33 (SD = 0.82, range, 2–4). Another of the co-authors (A.D.L.), who trained herself on Tanner ratings for this subproject, also rated the Tanner stages for the pubescent females and males; inter-rater reliability was $r = .87$ for female breast development, $r = .93$ for female pubic hair growth, $r = .87$ for male genital development, and $r = .83$ for male pubic hair growth (all were significant at $p < .05$).

Phallometric Response Processing

Penile blood volume change was sampled four times per second. The participant's response was quantified in two ways: as the extremum of the curve of blood volume change (i.e., the greatest departure from initial value occurring during the 54 s of the trial) and as the area under the curve. To identify participants whose penile blood volume changes during the test trials remained within the range typical of random blood volume fluctuations in nonaroused men, the mean of the three highest positive extremum scores—a quantity called the *Output Index* (Freund, 1967)—was calculated. The phallometric data of participants who failed to meet the criterion output index of 1.0 cc were excluded. As measured by the Laboratory's equipment, full erection for the average man corresponds to a blood volume increase of 20–30 cc.

Each participant's 28 extremum scores were then converted into standard scores, based only on his own extremum data, and the same operation was carried out on his area scores. Next, for each participant, the standardized extremum and area scores were combined to yield a separate composite score for each of the 28 trials, using the formula: $(Z_i^E + Z_i^A)/2$, where Z_i^E is the standardized extremum score for the i th trial, and Z_i^A is the standardized area score for the i th trial. These operations were carried out for the following reasons: (a) In phallometric work, some transformation of raw scores is generally required in combining data from different participants, because the interindividual variability in absolute magnitude of blood volume changes can otherwise obscure even quite reliable statistical effects. There are numerous sources of such variability, for example, the participant's age, his state of health, the size of his penis, and the amount of time since his last ejaculation from masturbation or interpersonal sexual activity. Empirical research has shown the Z-score transformation to be optimal (Earls, Quinsey, & Castonguay, 1987; Harris, Rice, Quinsey, Chaplin, & Earls, 1992; Langevin, 1985). (b) The (highly correlated) area and extremum Z-scores were averaged to obtain a composite that reflected both the speed and

amplitude of response and lessened the impact of anomalous responses, that is, large change from initial value but small area or vice versa (Freund, Scher, & Hucker, 1983).

In the last stage of basic processing, the data were reduced to seven final scores for each participant by averaging his four composite scores in each of the seven stimulus categories. These seven *category scores* were taken as measures of the participant's relative erotic interest in adult women, pubescent girls, prepubescent girls, and so on.

Results

The first task of data analysis was assigning participants to discrete groups according to the ages of their most desired partners. No single item in our recorded data contained the participant's response to the simple question, "What is the typical age of persons who most attract you sexually?" It was, furthermore, impossible simply to classify participants according to the gender-age category to which they gave the maximum attractiveness rating, because participants could—and sometimes did—report the maximum rating for more than one category. We therefore attempted to classify participants into non-overlapping age-preference groups according to some parameter of their overall attractiveness ratings profile. We investigated two different parameters for this purpose. The first parameter was the oldest age category whose attractiveness rating was greater than or equal to the mean rating of all younger categories. The second parameter was the youngest age category whose attractiveness rating was greater than or equal to the mean rating of all older categories. Use of the second parameter resulted in a better distribution of cases across the younger age-preference groups, and it was chosen on that basis. The complete algorithm for converting our attractiveness ratings into age-preference groups worked as follows.

If the mean of the participant's attractiveness ratings for all six categories of females (ages 5 and younger, 6–10, 11, 12–14, 15–16, and 17 or older) was greater than his mean for all six categories of males, then the participant was designated as heterosexual. If the mean of his attractiveness ratings for all categories of males was greater than his mean for all categories of females, then he was designated as homosexual. The 34 participants with exactly equal means (i.e., bisexuals) were excluded from further processing.

Heterosexual participants were then classified into six age-preference groups according to the following series of tests performed in the following order.

1. If the participant's attractiveness rating for females age 0–5 was greater than or equal to his mean attractiveness rating for the five older age categories, then he was classified as a *Pedophile 1*.

2. If the participant's rating for females age 6–10 was greater than or equal to his mean rating for the four older age categories, then he was classified as a *Pedophile 2*.
3. If the participant's rating for females age 11 was greater than or equal to his mean rating for the three older age categories, then he was classified as a *Hebephile 1*.
4. If the participant's rating for females age 12–14 was greater than or equal to his mean rating for the two older age categories, then he was classified as a *Hebephile 2*.
5. If the participant's rating for females age 15–16 was greater than or equal to his rating for females age 17 or older, then he was classified as an *Ephebophile*.
6. If the participant, having passed through all the foregoing tests, had no known sexual offenses against persons under the age of 15 and no child pornography offenses, then he was classified as a *Teleiophile*.

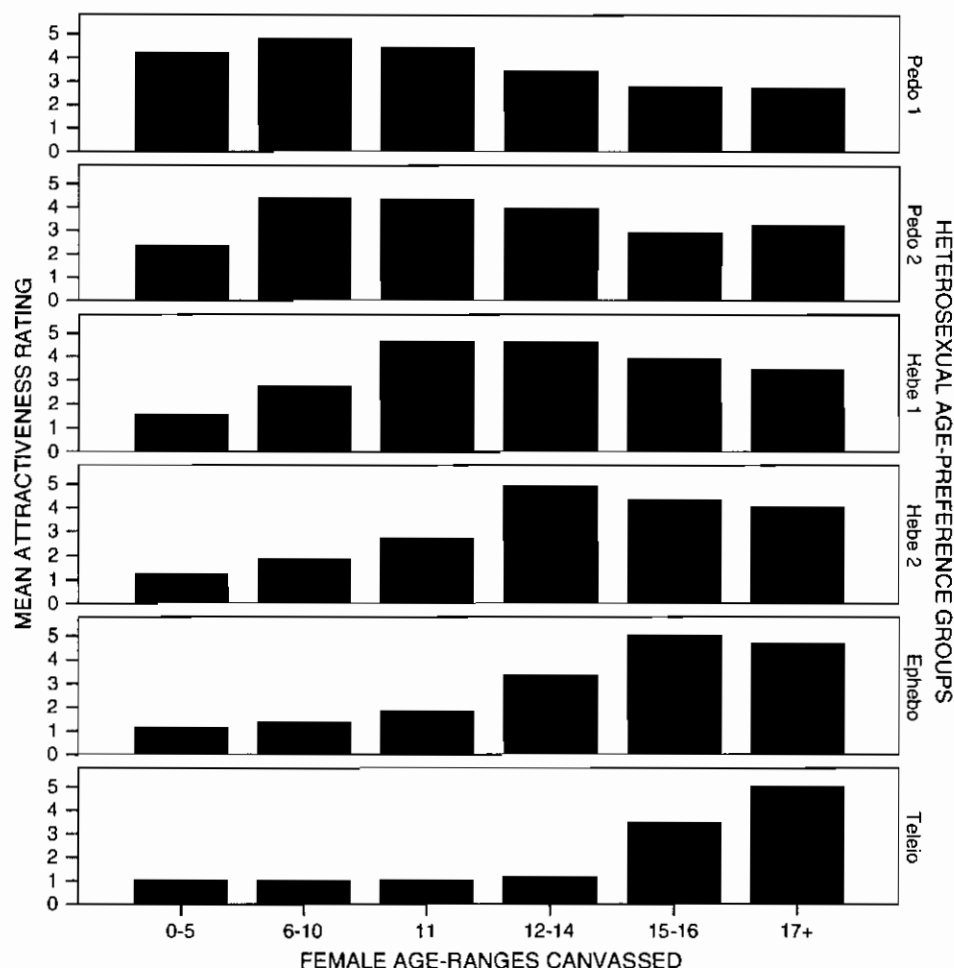
Homosexual participants went through a parallel series of tests, based on their attractiveness ratings for the six age-categories of males and on their known sexual offenses, and they were assigned to the corresponding six age-preference groups.

Figures 1 and 2 show the empirical relations between the computed age-preference groups and the attractiveness ratings on which they were based. Figure 1 shows the data for the heterosexual groups, and Fig. 2, for the homosexual groups. These data demonstrate that the classification algorithm worked as we had hoped and provide the empirical justification for the group-labels, *Pedophile 1*, *Pedophile 2*, and so on.

Most of the individual participants had attractiveness ratings profiles that resembled the mean profile of the age-preference group to which they had been assigned. Thus, for example, 90% of heterosexual *Hebephile 1* group gave the maximum attractiveness rating of "5" to females age 11 or 12–14 (or both), and 93% of the heterosexual *Hebephile 2* group gave the maximum attractiveness rating to females age 12–14 or 15–16 (or both). In the homosexual *Hebephile 1* group, 80% gave the maximum attractiveness rating to males age 11 or 12–14; in the homosexual *Hebephile 2* group, 100% gave the maximum attractiveness rating to males age 12–14 or 15–16. Because the ratings profiles were necessarily related to the age-preference groups via the computational algorithm, we did not perform any statistical comparisons of them.

The offenders against persons under age 15 and child pornography offenders were excluded from the teleiophilic groups (algorithm step #6) because men who claim a preference for adults but have committed offenses against children are often truly pedophilic or hebephilic (e.g., Blanchard et al., 2001, 2006; Freund & Blanchard, 1989; Seto, Cantor, & Blanchard, 2006). Thus, these participants were excluded on the grounds that their phallometric responses would be relatively likely to reflect deliberate attempts to manipulate the test outcome. The data of many of these excluded "nonadmitters" have been

Fig. 1 Attractiveness ratings for females of various ages, for the heterosexual age-preference groups. The age-preference abbreviations are interpreted as follows: Pedo, pedophile; Hebe, hebephile; Ephebo, ephebophile; Teleio, teleiophile. The anchor-points for the attractiveness ratings are as follows: 1, females of the canvassed age stimulate no sexual interest; 5, females of that age stimulate as much sexual interest as the participant is capable of feeling



analyzed in previous studies (Blanchard et al., 2001, 2006). The offense-history criterion excluded 1,387 participants from the heterosexual teleiophilic group and 53 from the homosexual teleiophilic group.

The number of participants in each age-preference group and their mean ages at testing are presented in Table 1. One-way analyses of variance revealed no significant differences in age among the heterosexual groups, $F(5, 739) = 2.15$, n.s., or among the homosexual groups, $F(5, 130) < 1$.

Table 1 also shows the median ages of the victims of the participants' sexual offenses. The median victim age was determined, for each group, by summing their total number of victims in all age-ranges and then determining the age-range in which the median fell. Thus, for example, the heterosexual Pedophile 1 group had 109 (female) victims: 16 victims age 5 or younger, 52 victims age 6–10, 12 victims age 11, 12 victims age 12–14, 11 victims age 15–16, and 6 victims age 17 or older. The median age is the age of the 55th oldest victim, and the 55th oldest victim fell in the 6–10 age-range.

There was one restriction on computing the median victim age. In order to prevent the few participants with very large numbers of victims (usually exhibitionists) from dis-

torting the results, the participant's number of victims in any given gender-age category was artificially capped at 10.

Within-Groups Comparisons

The dependent measures of primary interest in this study were the participants' penile responses in the laboratory to stimulus depictions of prepubescent children, pubescent children, and adults. Figure 3 shows, for each heterosexual age-preference group, that group's mean penile response to prepubescent girls, its mean response to pubescent girls, and its mean response to adult women. Thus, for example, the topmost panel of Fig. 3 shows that the heterosexual Pedophile 1 group responded most to prepubescent girls, less to pubescent girls, and least to adult women. The next panel down shows that the heterosexual Pedophile 2 group responded slightly more to pubescent than to prepubescent girls but still least to adult women. Figure 4 shows the analogous data for the homosexual age-preference groups.

Our phallometric test did not include stimuli depicting persons in mid-adolescence or late adolescence. Thus, there

Fig. 2 Attractiveness ratings for males of various ages, for the homosexual age-preference groups. The age-preference abbreviations are interpreted as follows: Pedo, pedophile; Hebe, hebephile; Ephebo, ephebophile; Teleio, teleiophile. The anchor-points for the attractiveness ratings are as follows: 1, males of the canvassed age stimulate no sexual interest; 5, males of that age stimulate as much sexual interest as the participant is capable of feeling

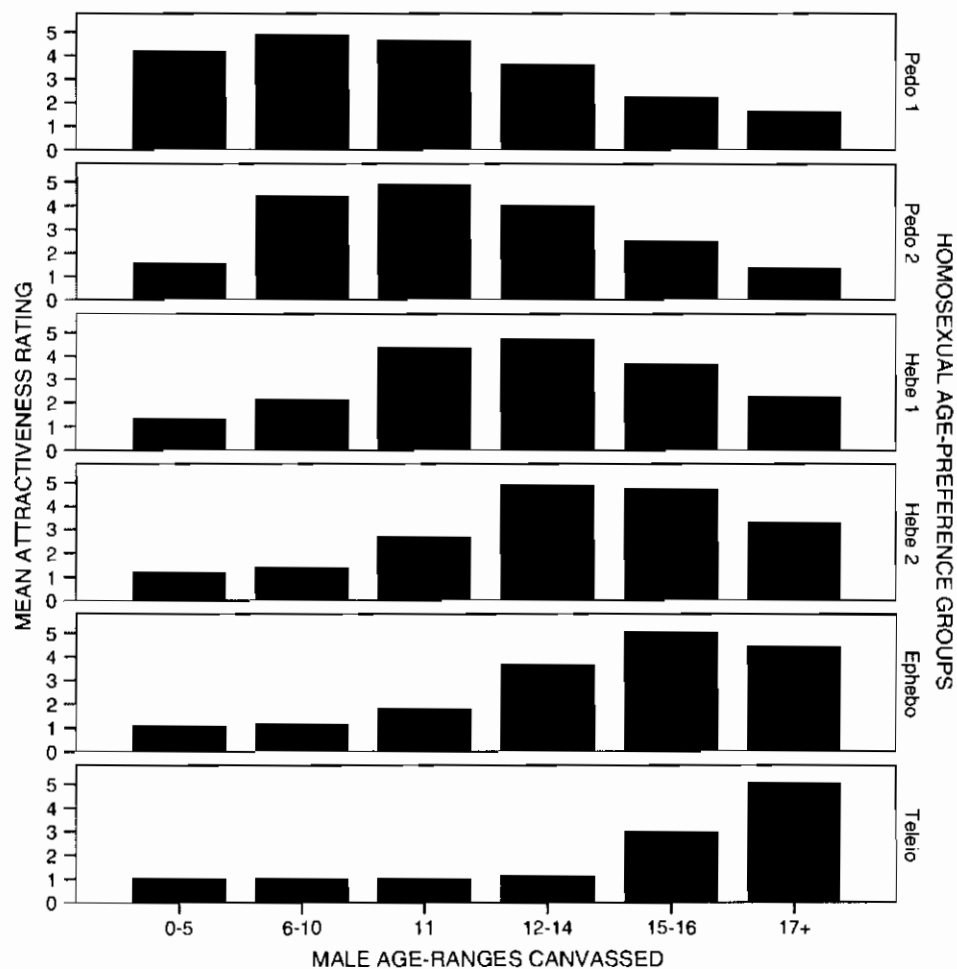


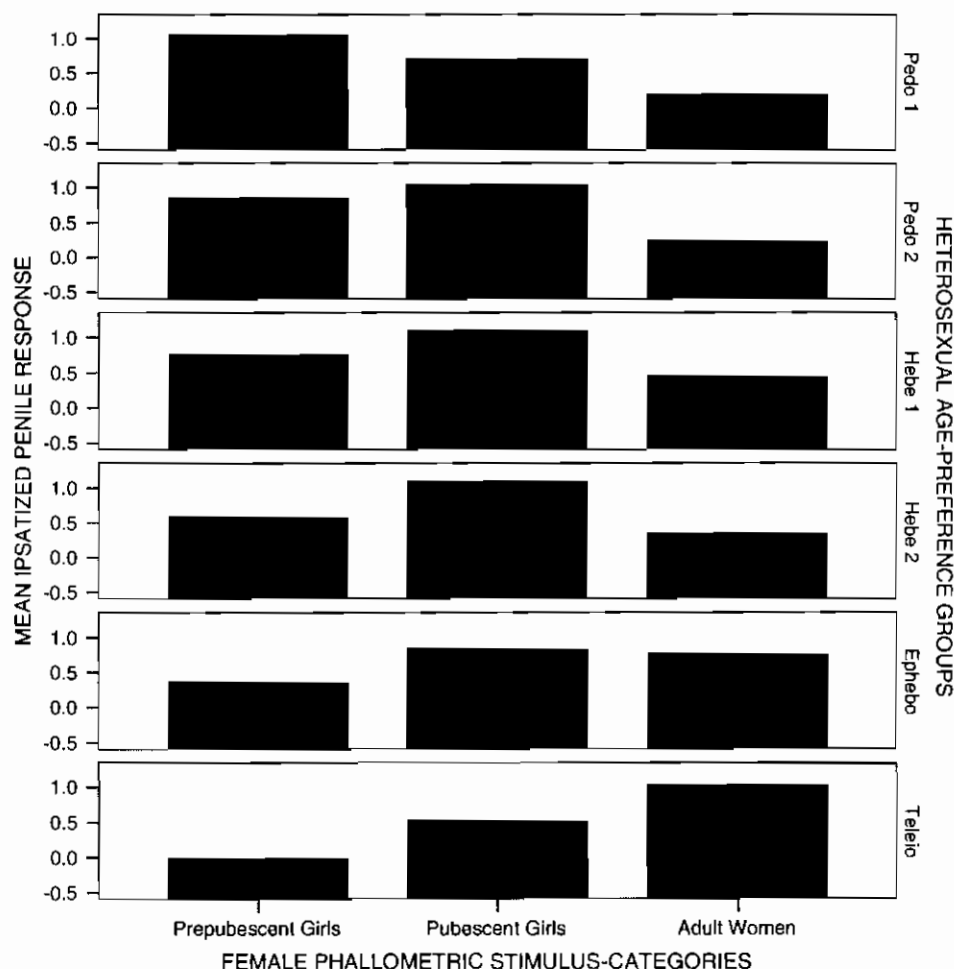
Table 1 Group size, mean age at testing, and median ages of the victims of the participants' sexual offenses

Gender-preference	Age-preference					
	Pedo 1	Pedo 2	Hebe 1	Hebe 2	Ephebo	Teleio
Heterosexual						
Group size	21	46	30	46	50	552
Age	33.14 (13.02)	30.48 (10.52)	35.30 (12.27)	34.96 (13.67)	33.68 (13.78)	35.85 (11.30)
Median victim age	6-10	11	12-14	12-14	12-14	≥17
Homosexual						
Group size	15	17	10	18	18	58
Age	36.00 (12.94)	40.41 (15.24)	40.30 (10.56)	39.00 (15.80)	35.39 (11.85)	39.12 (11.50)
Median vietim age	6-10	11	12-14	12-14	15-16	≥17

was no optimal stimulus-category for the self-reported ephebophiles to respond to. One might therefore expect that the ephebophiles would respond about equally to pubescents and adults. These are the two age-categories adjacent to adolescence; the missing peak phallometric response between responses to pubescents and responses to adults would correspond to the missing adolescent stimuli. The data did, in fact,

show precisely this pattern for the heterosexual ephebophiles (Fig. 3) but not for the homosexual ephebophiles (Fig. 4). The phallometric profile of the homosexual ephebophiles corresponded to the expected pattern for hebephiles, not to our hypothesized pattern for ephebophiles. In fact, the phallometric profiles of the homosexual participants seemed generally to be shifted one category compared with the hetero-

Fig. 3 Mean penile response of the six heterosexual age-preference groups to laboratory stimuli depicting prepubescent, pubescent, and physically mature females. The means for the prepubescent, pubescent, and physically mature males are not shown



sexual participants. Thus, the profile of the homosexual Ephebophile group resembled that of the heterosexual Hebephile 2 group; the homosexual Hebephile 2 group resembled the heterosexual Hebephile 1 group; the homosexual Hebephile 1 group resembled the heterosexual Pedophile 2 group; and both homosexual pedophilic groups were shifted toward response to younger persons compared with the heterosexual Pedophile 1 group. It is unclear whether this result reflects a fact of nature, some specific properties of our phallometric stimuli, some specific properties of our sample, or simply the much smaller size of the homosexual group. In any event, the phallometric profiles of the homosexual and heterosexual teleiophiles were very similar, so the results did not reveal a uniform tendency for homosexual participants to respond in the laboratory to younger persons than they indicate in interview.

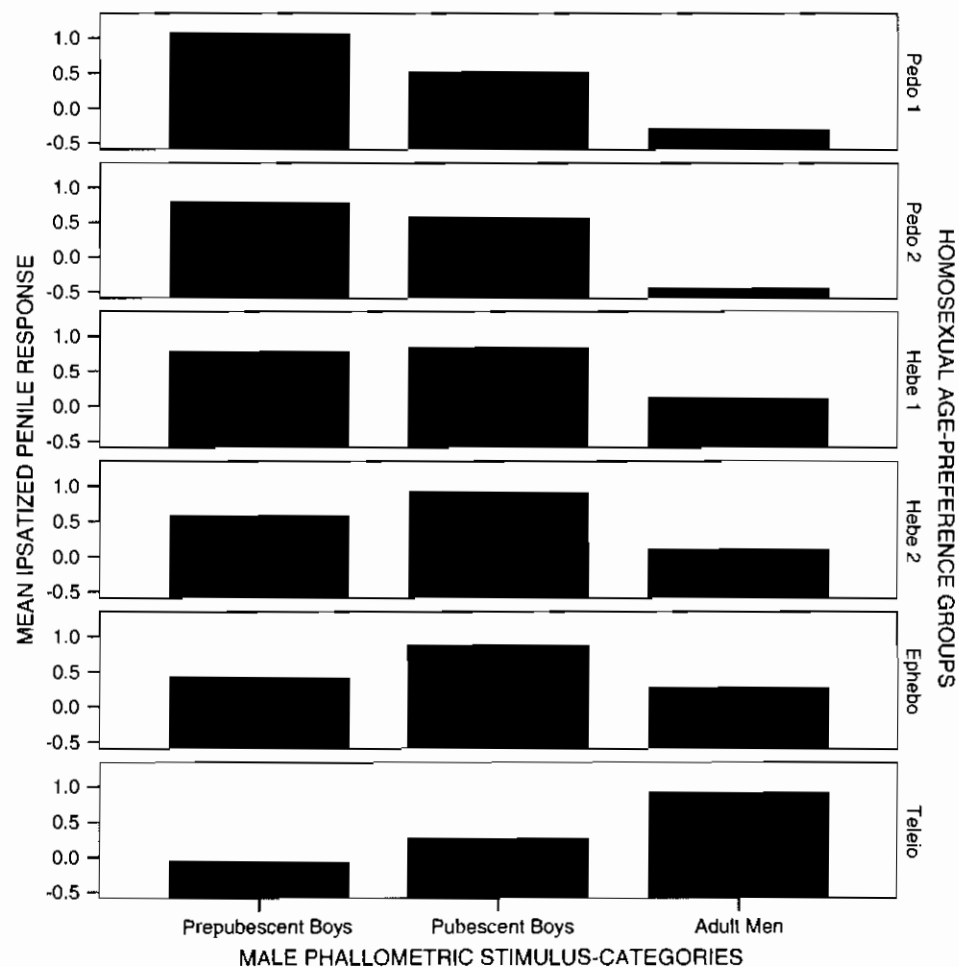
Statistical analyses were conducted on the data shown in Figs. 3 and 4 to ascertain whether the pedophiles responded significantly more to prepubescent children than they did to older persons, whether the teleiophiles responded significantly more to adults than to younger persons and—most

critically—whether the hebephiles responded significantly more to pubescent children than they did to both older and younger persons. These analyses used paired *t*-tests. For each age-preference group, three such *t*-tests were performed: response to pubescent children vs. response to prepubescent children, response to pubescent children vs. response to adults, and response to prepubescent children vs. response to adults.

The results for the heterosexual participants are presented in Table 2. Although the reader can determine from the signs of the reported *t*-statistics which of two compared means had the higher value, the table is most readily interpreted in conjunction with Fig. 3. In what follows, we comment only on the key findings in Table 2.

The Pedophile 1 group did respond more to prepubescent girls than to pubescent girls, but the Pedophile 2 group responded more strongly to pubescent girls. Both hebephilic groups showed exactly the pattern we expected. They responded significantly more to pubescent girls than to prepubescent girls or to adult women. The Ephebophiles, as previously noted, responded about equally to pubescent girls and adult women. They responded least to prepubescent girls.

Fig. 4 Mean penile response of the six homosexual age-preference groups to laboratory stimuli depicting prepubescent, pubescent, and physically mature males. The means for the prepubescent, pubescent, and physically mature females are not shown



The Teleiophiles responded more to adult women than to pubescent girls, and more to pubescent girls than to prepubescent girls.

The findings for the homosexual participants are given in Table 3, which can be interpreted with the aid of Fig. 4. Both pedophilic groups responded more to prepubescent boys than to pubescent boys. Neither hebephilic group showed exactly the pattern we expected, in that neither group responded significantly more to pubescent boys than to prepubescent boys. This might have to do with small sample sizes and low statistical power, especially in the case of the Hebephile 2 group, which did show a trend in the expected direction. The Ephebophile group, as previously mentioned, showed the pattern we expected for the hebephilic groups. They responded significantly more to pubescent boys than to prepubescent boys or adult men. The results for the homosexual Teleiophiles resembled those of their heterosexual counterparts: They responded more to adult men than to pubescent boys, and more to pubescent boys than to prepubescent boys.

In order to ensure that the key findings above were not an artifact of our method for assigning cases to age-preference

groups, we confirmed these findings using a much simpler method. We selected all heterosexual participants who gave the maximum attractiveness rating of "5" to girls age 11 or to girls age 12–14 (or to girls in both age categories). We ignored the participants' algorithmically computed age-preference group assignment, and we ignored their attractiveness ratings for all other age categories. This selection criterion identified 115 participants. We used paired *t*-tests to compare their penile responses to pubescent girls vs. prepubescent girls, and to pubescent girls vs. adult women. The participants responded significantly more to pubescent girls than to prepubescent girls, $t(114) = 5.26$, $p < .0001$, and they responded significantly more to pubescent girls than to adult women, $t(114) = 12.23$, $p < .0001$. We similarly selected 49 homosexual men who gave the maximum attractiveness rating of "5" to boys age 11 or 12–14. These men did not respond significantly more to pubescent boys than to prepubescent boys, $t(48) < 1$, but they did respond significantly more to pubescent boys than to adult men, $t(48) = 8.89$, $p < .0001$. In summary, the alternative method of identifying hebephilic men led to the same conclusions as the data presented in Tables 2 and 3.

Table 2 Ipsatized penile response: within-groups comparisons of means for heterosexual participants

Age-preference	df	Comparison					
		Pubescent girls vs. prepubescent girls		Pubescent girls vs. adult women		Prepubescent girls vs. adult women	
		<i>t</i>	<i>p</i>	<i>t</i>	<i>p</i>	<i>t</i>	<i>p</i>
Pedophile 1	20	-2.62	.02	4.38	.0003	5.48	<.0001
Pedophile 2	45	2.64	.01	7.10	<.0001	5.14	<.0001
Hebephile 1	29	4.94	<.0001	7.42	<.0001	2.66	.01
Hebephile 2	45	4.95	<.0001	7.00	<.0001	2.02	.05
Ephebophile	49	5.46	<.0001	0.53	n.s.	-2.82	.007
Teleiophile	551	23.63	<.0001	-14.16	<.0001	-30.02	<.0001

Note: All *p*-values are two-tailed. A negative *t*-value indicates that the mean specified first in the column heading was lower than the mean specified second

Table 3 Ipsatized penile response: within-groups comparisons of means for homosexual participants

Age-preference	df	Comparison					
		Pubescent boys vs. prepubescent boys		Pubescent boys vs. adult men		Prepubescent boys vs. adult men	
		<i>t</i>	<i>p</i>	<i>t</i>	<i>p</i>	<i>t</i>	<i>p</i>
Pedophile 1	14	-3.00	.01	6.69	<.0001	6.94	<.0001
Pedophile 2	16	-2.97	.01	5.53	<.0001	6.81	<.0001
Hebephile 1	9	0.32	n.s.	4.12	.003	5.21	.001
Hebephile 2	17	1.83	n.s.	4.52	.0003	2.03	n.s.
Ephebophile	17	3.18	.005	2.70	.02	0.90	n.s.
Teleiophile	57	4.12	.0001	-5.82	<.0001	-8.18	<.0001

Note: All *p*-values are two-tailed. A negative *t*-value indicates that the mean specified first in the column heading was lower than the mean specified second

Between-Groups Comparisons

Figures 3 and 4 were designed to emphasize the isometry between the phallometric data and the self-report data presented in Figs. 1 and 2, and also to highlight the phallometric response-profile that was characteristic of each age-preference group. These bar graphs do not, however, provide the clearest illustration of the relations between groups. The data in Figs. 3 and 4 were therefore redrawn as line graphs in Figs. 5 and 6 to illustrate these relations. The data for the heterosexual groups are shown in Fig. 5, and the data for the homosexual groups are shown in Fig. 6. The mean penile responses of the six age-preference groups to prepubescent children are connected by dotted lines, the mean responses to pubescent children are connected by dashed lines, and the mean responses to adults are connected by solid lines.

Figures 5 and 6 suggest three findings: (a) The pedophiles had greater responses to prepubescent children than the hebephiles or teleiophiles, (b) the teleiophiles had greater responses to adults than the hebephiles or pedophiles, and—most importantly—(c) the hebephiles had greater responses to pubescents than the pedophiles or teleiophiles. These impressions were tested in analyses of variance using the default

polynomial contrasts provided by SPSS-15 (SPSS, Inc., Chicago, IL). The linear contrasts were used to demonstrate the first two findings, and the quadratic contrasts were used to demonstrate the third finding. The linear contrast coefficients, for the six age-preference groups from Pedophile 1 to Teleiophile, were -.598, -.359, -.120, .120, .359, and .598, and the quadratic contrast coefficients were .546, -.109, -.436, -.436, -.109, and .546. The quadratic contrasts were convenient for our purposes because the two “middle” means in the series belonged to the Hebephile 1 and Hebephile 2 groups; thus, the quadratic contrasts, in effect, tested whether the hebephiles’ penile responses differed from those of the other age-preference groups.

For the heterosexual age-preference groups, linear and quadratic contrasts were performed on mean penile responses to prepubescent girls, pubescent girls, and adult women. Similarly, for the homosexual age-preference groups, linear and quadratic contrasts were performed on mean penile responses to prepubescent boys, pubescent boys, and adult men. The results are presented in Tables 4 and 5.

Table 4 is readily interpreted in relation to Fig. 5. The table shows that the pedophilic groups responded more to the prepubescent girls than did the other groups (linear contrast), the

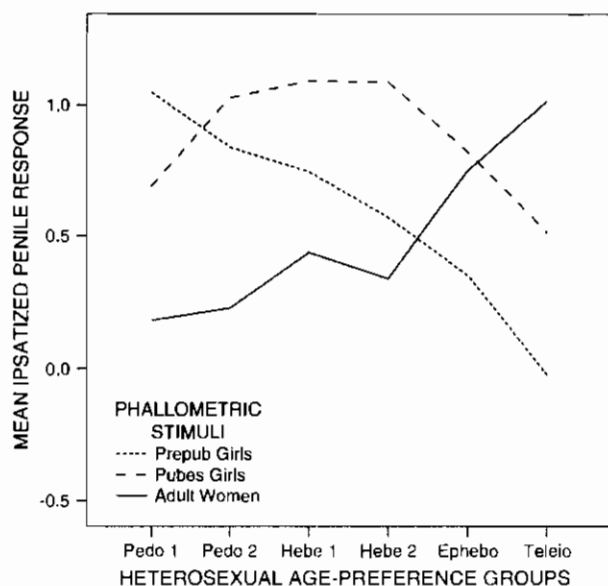


Fig. 5 Mean penile response of the six heterosexual age-preference groups to laboratory stimuli depicting prepubescent, pubescent, and physically mature females—redrawn to emphasize between-groups differences. Prepub Girls, prepubescent females; Pubes Girls, pubescent females; Adult Women, physically mature females

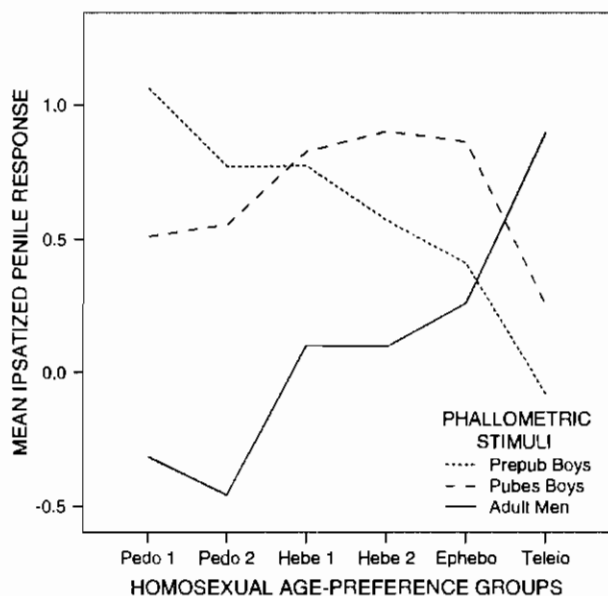


Fig. 6 Mean penile response of the six homosexual age-preference groups to laboratory stimuli depicting prepubescent, pubescent, and physically mature males—redrawn to emphasize between-groups differences. Prepub Boys, prepubescent males; Pubes Boys, pubescent males; Adult Men, physically mature males

hebephilic groups responded more to the pubescent girls than the other groups (quadratic contrast), and the teleiophilic group responded more to the adult women than the other groups (linear contrast). The p -values for these three contrasts were less than .0001.

There were a few “nuisance” results in Table 4 that require a word of explanation. There was a small but statistically significant linear contrast for mean responses to pubescent girls. That was because the inverted-U shape of the dashed line in Fig. 5 was slightly tilted; in other words, the mean response of the Pedophile 1 group was somewhat higher than the mean response of the Teleiophile group. There was also a small but statistically significant quadratic contrast for mean responses to adult women. That was because the increase in means from the Pedophile 1 group to the Hebephile 2 group was less pronounced than the increase from the Hebephile 2 group to the Teleiophile group.

Table 5 can be interpreted in relation to Fig. 6. The table shows that the pedophilic groups responded more to the prepubescent boys than did the other groups (linear contrast), the hebephilic groups responded more to the pubescent boys than the other groups (quadratic contrast), and the teleiophilic group responded more to the adult men than the other groups (linear contrast). The p -values for these three contrasts were less than, or rounded to, .0001. There were no other statistically significant results, possibly because the smaller sample size protected against “nuisance” results.

Discussion

The present study showed that hebephilia exists and—incidentally—that it is relatively common compared with other forms of erotic interest in children. This has two direct implications for the *DSM*, which also apply to clinical research. First, the *DSM-V* should expand the definition of

Table 4 Ipsatized penile response: between-groups comparisons of means for heterosexual participants

Phallometric stimuli	Polynomial contrast			
	Linear		Quadratic	
	$F(1, 739)$	p	$F(1, 739)$	p
Prepubescent girls	130.47	<.0001	3.61	n.s.
Pubescent girls	5.63	.02	39.09	<.0001
Adult women	56.33	<.0001	4.92	.03

Table 5 Ipsatized penile response: between-groups comparisons of means for homosexual participants

Phallometric stimuli	Polynomial contrast			
	Linear		Quadratic	
	$F(1, 130)$	p	$F(1, 130)$	p
Prepubescent boys	63.32	<.0001	2.44	n.s.
Pubescent boys	0.10	n.s.	17.38	.0001
Adult men	63.94	<.0001	3.56	n.s.

Pedophilia so that it includes erotic attraction to pubescent and prepubescent children or, alternatively, add a separate diagnosis of Hebephilia. If the latter option were chosen, patients attracted to both prepubescent and pubescent children more than to adults could be given both diagnoses (Pedophilia and Hebephilia). That would cover those individuals referred to by Freund, Seeley, Marshall, and Glinfort (1972) as “pedohebephiles.” Another possibility would be to completely replace the diagnosis of Pedophilia with Pedohebephilia and allow the clinician to specify one of three subtypes: Sexually Attracted to Children Younger than 11 (Pedophilic Type), Sexually Attracted to Children Age 11–14 (Hebephilic Type), or Sexually Attracted to Both (Pedohebephilic Type).

Second, the *DSM* diagnostic specifiers, which currently include the gender of children who most attract the patient sexually, should also include the typical age of children who most attract the patient sexually. This second point agrees with the suggestions of several authors that the *DSM-V* should include continuous measures of psychopathology as well as discrete diagnostic categories (Regier, 2007). The age of persons to whom the individual is most attracted would be an ideal continuous measure of erotic age-preference: It has a built-in metric, it corresponds to something in the real world, and it can be interpreted by any clinician without specialized training. It is true that a most-preferred-age item, whether incorporated into a self-administered questionnaire or a structured interview for sex offenders, will elicit many lies and distortions, but that is true of any self-report methodology, and this item has the virtue of simplicity. Examiners might find it useful, in determining the most attractive age for intellectually limited patients, to show them a standard set of nude photographs, line drawings, or silhouettes that illustrate the characteristic body shapes of males and females at all ages from infancy to senescence. Such a set of illustrations might conceivably be obtained from endocrinology texts or other medical sources. The patient could simply pick the image that represents his erotic ideal, and the examiner could record the associated age.

It is relevant here to consider the use of different age-ranges for boys and girls when dichotomously classifying men's sexual targets as pubescent or prepubescent. As noted in the introduction to this article, the pubertal growth spurt in height starts about 2 years earlier for girls than for boys. Other signs of maturation, for example, pubic hair, begin to appear at about the same time in both sexes. One aspect of maturation—fecundity—actually appears earlier in boys than in girls (Wood, 1994, p. 404 and Fig. 9.4). Our study did not attempt to address the question of different age-ranges. One would probably not lose much precision in using the same age-range (e.g., 11 through 14) in designating both male and female children as pubescent, given that the onset of puberty varies from child to child and given that the boundaries of puberty are fuzzy to begin with. Thus, it does not seem absolutely

necessary to use different criteria when diagnosing hebephilia in homosexual and heterosexual men.

Our demonstration of heterosexual hebephilia was more clear-cut than our demonstration of homosexual hebephilia. Our first main conclusion—men who verbally report maximum sexual attraction to pubescent children produce greater penile responses to depictions of pubescent children than to depictions of younger or older persons—applies in full only to heterosexual men. We could not demonstrate that (self-reported) homosexual hebephiles respond more to pubescent boys than to prepubescent boys. One possible reason for this is insufficient statistical power: Our combined number of homosexual pedophiles and hebephiles was less than half our number of heterosexual pedophiles and hebephiles. There are at least two other possible methodological reasons for this discrepant finding: (a) Our prepubescent female models were age 3–11, whereas our prepubescent male models were age 5–11, and (b) the sexual development of the pubescent female models, according to their Tanner ratings, was somewhat less advanced than the sexual development of the pubescent male models. It is difficult to know how, or even whether, these seemingly small differences affected the outcome. It is, of course, conceivable that the results relate to some inherent difference between heterosexual and homosexual hebephiles, but it is impossible, given the above-mentioned inequalities, to conclude that.

The main methodological limitation of the present study was the absence of models age 15–18 (mid- to late-adolescence) among the phallometric stimuli. That made it impossible to directly validate self-reports of ephebophilia. On the positive side, our cumbersome method of pinpointing the participant's erotic age-preference appears to have worked tolerably well, although we would not necessarily recommend it to other researchers. It seems probable that the simply query, “What is the typical age of persons who most attract you sexually,” would obtain the same information more simply, although it might require some follow-up questions before a single value could be recorded.

The study produced various findings that lay outside our main focus but are nonetheless of theoretical interest. First, the phallometric profiles of the homosexual participants generally paralleled those of the heterosexual participants. Thus, the homosexual pedophiles differentiated between prepubescent boys and adult men just as well as the heterosexual pedophiles differentiated between prepubescent girls and adult women; the homosexual and heterosexual teleiophiles also distinguished between children and adults of their preferred gender to similar degrees (compare Figs. 3 and 4). This parallelism had previously been demonstrated for homosexual and heterosexual teleiophiles (Freund et al., 1973), but not for homosexual and heterosexual pedophiles.

Second, there was a remarkable concordance between the participants' self-reported age-preferences and their phal-

lometric profiles. This shows that penile response in the laboratory can be a fairly sensitive measure of erotic preferences in cooperative participants. The inherent limitations of the phallometric method are not the technical problems in measuring penile blood volume or the creative problems in devising effective stimuli for a range of paraphilics, but rather the willingness and ability of uncooperative men to affect the test outcome. Outside the criminal justice system and its associated clinics—where it is primarily used as a blunt instrument in diagnosing paraphilia in nonadmitters (e.g., Blanchard et al., 2001; Freund & Blanchard, 1989)—the phallometric method is probably underutilized for examining subtle theoretical questions regarding erotic preferences.

Third, our missing data on ephebophilia notwithstanding, erotic age-preferences appear to constitute a continuum rather than a series of discrete taxa. This is not surprising, when one considers the continuous nature of human physical development. Human beings, unlike butterflies, do not disappear in one form and reappear in another. The continuous nature of erotic age-preferences does not, however, tell us anything about etiology. It does not, for example, imply that pedophilia and hebephilia have the same etiology, with the difference between them reflecting some kind of dosage effect. It is quite possible, in fact, that both variant age-preferences have multiple etiologies (Blanchard et al., 2002; Seto, 2008, p. 210). This appears to be the case for variant erotic gender-preference: A substantial amount of evidence indicates that homosexuality has one cause (or set of causes) in right-handed men and another cause in non-right-handed men (Blanchard, 2008). It would almost be surprising if multiple etiologies did not contribute to pedo- and hebephilia.

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EXHIBIT B

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ORIGINAL ARTICLE

Physical Height in Pedophilic and Hebephilic Sexual Offenders

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Abstract Adult men's height reflects, not only their genetic endowment, but also the conditions that were present during their development *in utero* and in childhood. We compared the adult heights of men who committed one or more sexual offenses and who were erotically interested in prepubescent children (*pedophilic sexual offenders*; $n=223$), those who were erotically interested in pubescent children (*hebephilic sexual offenders*; $n=615$), and those who were erotically interested in adults (*teleiophilic sexual offenders*; $n=187$), as well as men who had no known sexual offenses and who were erotically interested in adults (*teleiophilic nonoffender controls*; $n=156$). The pedophilic and the hebephilic sexual offenders were significantly shorter than the teleiophilic nonoffender controls. The teleiophilic sexual offenders were intermediate in height between the nonoffenders and the pedophilic and hebephilic sexual offenders and not significantly different from any of the other groups. This suggests that—regardless of whatever psychological sequelae might also have followed from the conditions present during early development—pedophilic and hebephilic sexual offenders were subject to conditions capable of affecting their physiological development.

Keywords Anthropometry · Height · Morphometry · Pedophilia · Sexual abuse · Sex offenders · Phallometry

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Adult men's height reflects not only the genes they inherited, but also the conditions present during their *in utero* and childhood development, such as nutrition, pathogen exposure, and economic circumstances (e.g., Gunnell 2002; Silventoinen et al. 1999; Wadsworth et al. 2002). Suboptimal conditions during development yield lower than average rates of growth (e.g., Barker et al. 1993; Montgomery et al. 1997; Perri et al. 1997) and increase the risks of various health problems in adulthood (e.g., Lundberg 1993; Rahkonen et al. 1997; Smith et al. 1998). These associations explain the otherwise non-intuitive relationships between height and health: Adulthood height correlates negatively, for example, with risk of heart disease (Lundberg et al. 2002; Parker et al. 1998; Walker et al. 1989) and stroke (e.g., Hart et al. 1999; McCarron et al. 2000; Song et al. 2003), and positively with overall longevity (e.g., Elo and Preston 1992; Kemkes-Grottenthaler 2005). Height also correlates negatively with the risks of developing diseases of the nervous system, including schizophrenia (e.g., Brooksbank et al. 1970; Houston and Bloom 1975; Nopoulos et al. 1998) and Alzheimer's disease (e.g., Abbott et al. 1998; Beeri et al. 2005).

We refer to the hypothetical factors that increase the probability of developing an erotic interest in children as *pedophilogenic*¹ factors, and the above associations suggest that height may be helpful in identifying the pedophilogenic factors that were present during development. We have previously hypothesized (Blanchard et al. 2002) that some circumstance of pre- or perinatal life affects the development of the brain, yielding a constellation of neurobehavioral traits that includes pedophilia: MRI studies of brain structure show that pedophilic and nonpedophilic men differ neuroanatomically (Cantor et al. 2006a; Schiffer et al. 2007; Schiltz et al. 2007), and retrospective studies of relevant behaviors suggest that neuroanatomical differences were also present earlier in life. Relative to controls, pedophilic men more frequently failed grades in school or required placement in special education systems (Cantor et al. 2006b), more frequently suffered head injuries during childhood (Blanchard et al. 2002, 2003), and are approximately three times more likely to be non-right-handed (Cantor et al. 2004, 2005). Evidence that pedophiles differ from nonpedophiles in height would suggest that—regardless of whatever psychological sequelae might also have followed from early conditions—pedophilic males were subject to conditions capable of affecting their physiological development.

Two prior studies provided data on the heights of pedophilic and of nonpedophilic men (Mellan et al. 1969; Taylor et al. 1993). Both investigations reported their pedophilic group to be shorter than their nonpedophilic group, 1.7 in. (4.3 cm) in the case of Taylor et al. (1993) and 1.1 cm in the case of Mellan et al. (1969). Neither difference was statistically significant at $\alpha=0.05$, although we calculated the p -value for the Taylor sample from its reported means and standard deviations to have been $p=0.053$ (two-tailed). The group differences might not have achieved statistical

¹ Authors use *pedophilia* to refer to the erotic interest in prepubescent children (von Krafft-Ebing 1965), *hebephilia* to refer to the erotic interest in pubescent children (Glueck 1955), and *pedohebephilia* to refer to the superordinate category that includes them both (Freund et al. 1972). Thus, one might refer to factors that are pedophilogenic, hebephilogenic, or pedohebephilogenic; however, unless it turns out that the aforementioned erotic interests are produced by different factors, such a distinction is moot, and we choose, albeit arbitrarily, to apply the shorter and more intuitive construction, *pedophilogenic*, to refer to factors that increase the probability of developing either pedophilia or hebephilia.

significance due to insufficient power associated with sample size, 23 pedophiles in the case of Taylor et al. (1993) and 98 in the case of Mellan et al. (1969). Analyzing larger samples could be more effective in detecting any association between height and pedophilia. In order to revisit in a larger sample whether pedophilic and nonpedophilic men differ in height, we reviewed data archived in the clinical database of the Kurt Freund Laboratory.

Materials and Methods

The present investigation involves three erotic age-preferences: *Pedophilia* refers to erotic interest in prepubescent children (von Krafft-Ebing 1965), *hebephilia* refers to erotic interest in pubescent children (Glueck 1955), and *teleiophilia* refers to erotic interest in adults (Blanchard et al. 2000).

Participants

All study participants were recruited from the Kurt Freund Laboratory of the Centre for Addiction and Mental Health (Toronto, Ontario, Canada), which provides evaluation services to male patients referred as a result of illegal or clinically significant sexual behaviors or interests. The primary source of referrals to the facility is parole and probation officers, with physicians and lawyers providing others. As detailed in the following, the standard assessment at the Laboratory consists of a psychophysiological (phallometric) examination of the patients' erotic preferences, a semi-structured interview of their sexual history and interests, a review of supplementary psychiatric and legal documents supplied by the referral source, and a brief questionnaire that includes questions about the patients' height.

The files of 1,181 patients of the Kurt Freund Laboratory contained sufficient information for the present analyses and were classifiable into one of the four groups by the criteria stated later. All patients underwent assessment between 1995 (when the Laboratory began recording the last of the relevant variables) and November, 2006 (when data collection for the investigation ended). The sample had a mean age of 39.0 years ($SD=13.7$) and median age of 38 years. The median education level was high school graduation. Non-Caucasian patients were excluded from the sample to avoid the effects of racial differences in height.

Of the entire sample, 51.4% were known to have committed a sexual offense against one or more victims ages 11 or under, 31.1% against one or more victims ages 12–14, 14.0% against one or more victims ages 15–16, and 33.2% against one or more victims ages 17 or older; 13.2% of the sample had no known victims of any sexual offenses. These latter patients received assessments following charges of possession of child pornography or because of the patient's concern regarding his own sexual urges, etc. The sum of these percentages exceeded 100% due to some patients having victims in more than one age category. In the following analyses, no distinction was made between intrafamilial offenses (i.e., incest offenses) and extrafamilial offenses.

Measures

Phallometric Measurement of Erotic Gender–Age Preference

Blanchard et al. (2007) described the phallometric procedure and data handling techniques in detail. Briefly, a computer records an examinee's penile blood volume while the examinee observes a standardized set of stimuli that depict a variety of activities and persons of potential erotic interest to the examinee. Change in the examinee's penile blood volume (i.e., his degree of penile erection) indicates his relative erotic interest in each class of stimuli. Clinicians and researchers employ phallometry to quantify the erotic interests of sexual offenders against children (e.g., Howes 1995), and meta-analytic reviews indicate that penile reactions to stimuli depicting children are among the strongest predictors of sexual recidivism for child molesters (Hanson and Bussière 1998; Hanson and Morton-Bourgon 2005). The specific phallometric protocol in use at the Kurt Freund Laboratory over the course of the present investigation has already been shown to distinguish pedophilic from teleiophilic men (Blanchard et al. 2001).

The stimuli used in the phallometric test were audiotaped narratives presented through headphones and accompanied by slides. There were seven categories of narratives. They described sexual interactions with either female children, female pubescents, female adults, male children, male pubescents, or male adults, or erotically neutral (i.e., solitary, nonsexual) activities. The accompanying slides depicted nude models corresponding in age and sex to the topic of the narrative. The neutral narratives were accompanied by slides of landscapes. The data reduction process, also outlined by Blanchard et al. (2007), yielded seven category scores, one to reflect each of the six combinations of the age group and sex of the stimuli, plus the neutral category.

Sexual Offense History and Self-reported Erotic Interests

A standardized form was used by the phallometric laboratory staff to record each patient's history of sexual offenses. The coding of this information included each patient's numbers of victims ages 11 or younger, victims ages 12–14, victims ages 15–16, and victims ages 17 or older. The information came primarily from documents that accompanied the patient's referral, such as reports from police, probation, or parole officers. Some patients themselves reported additional information regarding offenses that were not included in their files and for which they had not been charged. During patients' sexological assessment, they were asked to rate their own erotic interests in females of six age categories (17 years or older, 15–16 years, 12–14 years, 11 years, 6–10 years, and 5 years or younger) and again, for males in the same six age categories. The patient rated each category on a Likert scale from 1 (*strongest erotic interest*) to 5 (*least erotic interest*).

Physical Height

On the day of their phallometric assessments, all patients of the Kurt Freund Laboratory complete a standard questionnaire of demographic and family back-

ground information. The questionnaire included a question regarding patients' height and permitted patients to respond with either metric or Imperial units. For purposes of analysis, all responses were converted into centimeters. A trained research assistant reviewed all questionnaires and queried patients who provided contradictory or obviously erroneous answers to any of the questions, including height.

Group Assignment

Patients were divided into four discrete groups for data analysis: pedophilic sexual offenders, hebephilic sexual offenders, teleiophilic sexual offenders, and teleiophilic nonoffender controls. Patients who committed one or more sexual offenses were categorized as *pedophilic sexual offenders* if they responded more to a prepubescent child category than to any other gender–age category on the phallometric test (i.e., he responded more to either the prepubescent males or the prepubescent females than to the pubescent or adult males or females). If the sexual offender lacked a valid phallometric test, he was categorized as being pedophilic if he admitted to greater sexual attraction to prepubescent boys or girls than to any other gender–age category. Patients were categorized as *hebephilic sexual offenders* by the analogous criteria regarding pubescent, rather than prepubescent, children.

Because teleiophilia is the most desirable classification both socially and in the courtroom, many pedophilic or hebephilic patients endeavor to achieve it in interviews and on phallometric testing (see Blanchard et al. 2001). Thus, the classification of a patient in one of the teleiophilic groups was made more stringent by the addition of a second criterion: The first criterion was analogous to that for the pedophilic and hebephilic categories—a greater response to adult males or adult females than to any other category on the phallometric test, or (lacking a valid phallometric test) the patient stated that he was more attracted to persons past their 17th birthday than to younger persons. The second criterion was that the patient lacked any history that might contradict his phallometric results or self-report (i.e., he lacked any known offenses against male or female victims under age 17, and he had never been charged for or admitted to possessing child pornography). Men who were teleiophilic by these criteria were categorized as *teleiophilic sexual offenders* if they had committed any known sexual offenses (against an adult), such as indecent exposure or sexual assault. Teleiophilic men with no known sexual offenses were classified as *teleiophilic nonoffender controls*; general sexology patients such as these undergo assessment at the Kurt Freund Laboratory for other sexological concerns, such as sexual orientation issues and so-called “sexual addictions.”

In this article, as with previous investigations from this facility (e.g., Cantor et al. 2004), the term *sexual offenses* includes charges, credible accusations, and self-disclosures of criminal sexual behavior. *Credible accusations* were defined by default; that is, they included all accusations excepting those that were made by an individual who stood to gain in some way from criminal charges against the accused, that had no corroborative evidence, and that were not voiced at the time the alleged offense(s) occurred. Only a small proportion of accusations were not considered credible; typical examples were allegations—not followed by criminal charges—from estranged spouses in custody-and-access disputes.

Results

The mean height of the sample ($N=1,181$) was 176.4 cm ($SD=7.53$ cm; range=144.8 cm to 203.2 cm). One additional subject was 126 cm in height ($z=-6.3$). In order to prevent his relatively extreme score from unduly influencing any group differences, the subject was deemed an outlier and excluded from analysis. If retained in the sample, the subject would have been categorized as a pedophilic sexual offender.

Table 1 provides mean (SD) physical heights of the sample, by patient category. The pedophilic sexual offenders were the shortest of the four groups, and the teleiophilic nonoffender controls, the tallest. The significance of the group differences in height were ascertained by two regression analyses. For each regression, patient height was multiply regressed onto a set of three dichotomous variables that represented subjects' membership in one of the four groups (i.e., group membership was "dummy coded;" Cohen et al. 2003). The first regression used the teleiophilic nonoffender controls as the reference category, and the second regression used the teleiophilic sexual offenders as the reference category.

The first regression revealed that patient height was significantly associated with group membership, $F(3, 1,177)=2.99$, $p=0.030$. Both the pedophilic sexual offenders and the hebephilic sexual offenders were significantly shorter than the teleiophilic nonoffender controls (Model 1 of Table 2). To account for any effects of age on physical height, patient age was forced into the regression equation. Age accounted for a significant amount of the remaining variance, F -change (1, 1,176)=9.85, $p=0.002$, and the regression equation remained significant, $F(4, 1,176)=4.72$, $p=0.0009$. The group differences in height, now accounting for subject age, changed very little (Model 2 of Table 2); both the pedophilic sexual offenders and the hebephilic sexual offenders were significantly shorter than the teleiophilic non-offender controls.

The mean height of the teleiophilic sexual offenders was intermediate between that of the teleiophilic nonoffender controls on one hand and the pedophilic and the hebephilic sexual offenders on the other hand. To ascertain the significance of these differences, the second regression was run, using the teleiophilic sexual offenders as the reference category. The teleiophilic sexual offenders did not differ significantly from any of the other three groups (Table 3).

The mean height of Canadian men is 178 cm (Gilmore 1999). Each of the four patient groups was compared with that population value by t -tests for single samples. The teleiophilic nonoffender controls did not differ significantly from the

Table 1 Mean physical height by group

Group	n	Mean height	SD	95% Confidence interval	
				Lower bound	Upper bound
Teleiophilic nonoffenders	156	177.7	7.53	176.6	178.9
Teleiophilic sexual offenders	187	176.9	7.70	175.8	178.0
Hebephilic sexual offenders	615	176.1	7.24	175.5	176.7
Pedophilic sexual offenders	223	175.6	8.06	174.6	176.7

Table 2 Regression of physical height onto age and subject category—teleiophilic nonoffender controls as reference category

Effect	<i>B</i>	<i>SE_B</i>	<i>β</i>	<i>t</i>	<i>p</i>
Model 1					
Teleiophilic sexual offenders	−0.88	0.82	−0.04	−1.08	0.283
Hebephilic sexual offenders	−1.63	0.67	−0.11	−2.42	0.016
Pedophilic sexual offenders	−2.12	0.78	−0.11	−2.70	0.007
Model 2					
Teleiophilic sexual offenders	−0.88	0.81	−0.04	−1.09	0.277
Hebephilic sexual offenders	−1.54	0.67	−0.10	−2.29	0.022
Pedophilic sexual offenders	−2.00	0.78	−0.10	−2.56	0.011
Age	−0.05	0.02	−0.09	−3.14	0.002

N = 1,181; *B* = unstandardized regression coefficient (for subject categories, these represent the differences in centimeters of height between the subject categories and the teleiophilic nonoffender reference category); *SE_B* = standard error of the unstandardized regression coefficient; *β* = standardized regression coefficient

population mean height, $t(155) = -0.42$, $p = 0.67$. The hebephilic and pedophilic sexual offenders, however, were highly significantly different, $t(614) = -6.46$, $p < 0.00001$, and $t(222) = -4.40$, $p = 0.00002$, respectively. The teleiophilic sexual offenders were also significantly different from the population value, but less dramatically so, $t(186) = -2.01$, $p = 0.046$.

Discussion

The present analyses found that pedophilic sexual offenders are approximately 2 cm shorter than nonoffender controls, a difference that was statistically significant both before and after covarying age. For perspective, it is useful to compare this deficit in height with those associated with other factors: Male offspring of mothers who smoked 20 cigarettes or more per day during their pregnancies are approximately 1.1 cm shorter in adulthood than are sons of mothers who did not smoke (Fogelman and Manor 1988). Men who were born into families with alcohol problems are 0.9

Table 3 Regression of physical height onto age and subject category—teleiophilic sexual offenders as reference category

Effect	<i>B</i>	<i>SE_B</i>	<i>β</i>	<i>t</i>	<i>p</i>
Model 1					
Teleiophilic nonoffenders	0.88	0.82	0.04	1.08	0.283
Hebephilic sexual offenders	−0.76	0.63	−0.05	−1.20	0.229
Pedophilic sexual offenders	−1.25	0.75	−0.06	−1.67	0.095
Model 2					
Teleiophilic nonoffenders	0.88	0.81	0.04	1.09	0.277
Hebephilic sexual offenders	−0.66	0.63	−0.04	−1.05	0.295
Pedophilic sexual offenders	−1.12	0.74	−0.06	−1.51	0.132
Age	−0.05	0.02	−0.09	−3.14	0.002

N = 1,181; *B* = unstandardized regression coefficient (for subject categories, these represent the differences in centimeters of height between the subject categories and the teleiophilic nonoffender reference category); *SE_B* = standard error of the unstandardized regression coefficient; *β* = standardized regression coefficient

cm shorter than controls (Silventoinen et al. 1999), and men with schizophrenia are 2.3–6.8 cm shorter than controls (Brooksbank et al. 1970; Houston and Bloom 1975; Nopoulos et al. 1988). This suggests that whatever conditions are present during the development of pedo- and hebephilic sexual offenders, those conditions are capable of influencing physiological development as strongly as some well-known influences on height.

The present findings are consistent with our previously explicated hypothesis that pedo- and hebephilic men were exposed to some condition during childhood or *in utero* that affected their brain development in a way that increased their risk of developing deviant erotic age-preferences as well as neuroanatomically relevant behavioral deficiencies (Blanchard et al. 2002, 2003; Cantor et al. 2004, 2005, 2006b). It is possible that the as yet unidentified pedophilogenic factor(s) are agents that interfere with growth in general. Poor nutrition, toxin exposure, and infections are all such potential factors. The suboptimal growth of one or more components of the brain manifests as an increased risk of developing pedophilia and the associated neurobehavioral characteristics, and the suboptimal growth of the body manifests as lesser stature. It therefore becomes relevant to future investigations to ascertain whether pedophilic men also show evidence of suboptimal or perturbed growth in other organ systems that are not intuitively associated with committing sexual offenses against children.

The present data do not isolate the developmental epoch(s) during which pedophilic sexual offenders failed to achieve normal growth. Lesser growth could have occurred *in utero*, during prepubertal childhood, or during the pubertal growth spurt that ends upon attaining adult height. Subnormal growth may also have occurred during multiple periods of development. One of the other correlates of pedophilia, handedness, is established very early in life; fetuses demonstrate hand preferences *in utero* (Hepper et al. 1991, 2005). This may emphasize the need to study conditions during the earlier periods of development for potentially pedophilogenic factors and underscore the importance of examining other characteristics that are set early in development.

The relevance of childhood conditions for increasing the subsequent propensity to molest children is not a new idea. Sexual offenders against children have long been reported to indicate that, during their childhoods, they experienced poor relationships with their parents, physical abuse, and sexual abuse (e.g., Gebhard et al. 1965; Hanson and Slater 1988; Mohr et al. 1964; Tingle et al. 1986; Weeks and Widom 1998). Theorists have generally interpreted these conditions with regard to their symbolic or imitative value to psychological development, however, rather than with regard to their potential association with physiological development. That is, theorists have posited that men commit sexual offenses against children either as a response to psychological conflicts induced by the earlier conditions or as an expression of a conditioned behavior (e.g., Glasser et al. 2001; Hall and Hirschman 1992; Marshall and Marshall 2000). An association between pedophilia and height, however, would suggest an entirely biological explanation: Pedophilia is one of several biological sequelae determined by biological factors acting early in development, and the excess of abusive experiences reported to occur in childhood is causally incidental, observed because the families that are unable to provide the conditions necessary for optimal physical growth are often the same families in

which abuse occurs. That is, despite the retrospective observation of psychosocial differences between pedophilic and nonpedophilic men, their erotic age-preferences were determined biologically, and the psychosocial correlates were not themselves pedophilogenic.

Although the present findings are consistent with that purely biological theory of the etiology of pedophilia, the data do not necessarily rule out causal contributions of nonbiological factors. It remains possible that the psychosocial factors increased the risk of developing pedophilia, whereas the biological factors reduced height. In this scenario, height would correlate with pedophilia again because the presence of poor biological conditions (partially) predicts the presence of poor psychosocial conditions. Also, it is possible that there exist multiple—perhaps independently operating—means of increasing the risk of developing pedophilia, some of which are biological and some of which are not (and some of which require both biological and nonbiological contributions). Moreover, biological and nonbiological factors may interact, such as by biological factors predisposing an individual to developing pedophilia by making him more sensitive to subsequent psychosocial experiences. Finally, the present data are correlational in nature and cannot by themselves prove the direction of causality. Considered in isolation, these data are consistent with a causal model in which lesser height increases a male's probability of developing an erotic attraction to shorter individuals, such as children.

A 2 cm difference in height does not in itself suggest any obvious implications for the clinical treatment of deviant erotic age-preferences. Evidence that pedo- and hebephilia relate to physical characteristics that are acquired early in life would nonetheless be consistent with the idea that erotic age-preference is immutable, analogous to men's orientation as hetero- or homosexual. Immutability of age orientation would reinforce the justification of clinicians' use of relapse prevention interventions to help pedophiles manage their sexual interests (Laws et al. 2000) and argue against the feasibility of converting pedophiles into nonpedophiles by helping them to resolve psychological issues, such as low self-esteem, as has been suggested (e.g., Marshall et al. 1997, 1999).

The present data were equivocal regarding the teleiophilic sexual offenders. Their mean height was not significantly different from that of the pedophilic or hebephilic sexual offenders. This suggests that poor growth is not specific to the development of deviant erotic age preferences, as one would expect from the aforementioned associations between physical height, health, and longevity. The height difference between the teleiophilic sexual offenders and the teleiophilic nonoffender controls was also nonsignificant, so these data cannot be said to support the conclusion that deficient height is a characteristic of sexual offenders in general. The mean heights of the four groups did, however, form an intuitive pattern, suggestive of an association between greater departure from normal height and greater behavioral pathology: The teleiophilic nonoffender controls were the tallest (nonsignificantly shorter than the mean for all Canadian men), followed by the teleiophilic sexual offenders (who differ from normal with regard to committing a sexual offense), followed by the hebephilic sexual offenders (who differ from normal both with regard to their committing a sexual offense as well as with regard to their erotic age preference), followed by the pedophilic sexual offenders (who differ from normal with regard to committing a sexual offense and with regard to an age preference that

is further removed from normal than are the age preferences of the hebephilic offenders). It is plausible that increasingly adverse conditions during development increase the probability of suboptimal growth as well as increasing the probability of developing one or more pathologies.

The data used for the present analyses were obtained by self-report and are therefore potentially subject to reporting error. There is no obvious motivation for patients willfully to misreport their height during a general assessment, however, and any extreme errors in reporting one's height would be noticed by the assessors. Notwithstanding those arguments, it would be worthwhile to measure subjects' heights directly. Although measuring the heights of subjects' parents would also be potentially useful, doing so is unrealistic: Meaningfully representative samples of parents of pedophilic men would be extremely difficult to assemble.

Height is only one physical indicator of the conditions present during development. The present finding suggests that it would be worthwhile to ascertain whether pedophilic men show other indicators of adverse earlier life conditions. Possibilities include birth weight, birth length, and the presence of minor physical anomalies (small malformations of the skin, such as nonsymmetric ears and webbing between the toes; Jones 1997). Because minor physical anomalies develop only before birth and are stable throughout life, they could further suggest that the pedophilogenic factors are present earlier rather than later in life. Also useful would be epidemiological analyses of the obstetric and pediatric records from men subsequently identifiable as pedo- or hebephilic.

We undertook the present investigation to help elucidate the causes of deviant erotic age-preferences. It is not clear from the present data, however, whether the present results specifically pertain to pedo- and hebephilia, or to all paraphilias, of which pedo- and hebephilia are merely two exemplars. That is, it is conceivable that a group of men with paraphilias other than pedophilia (such as exhibitionism) would also have been shorter than the teleiophilic nonoffender control group. To address this possibility, it would be useful for future studies to include both a group of paraphilic teleiophiles as well as a group of non-paraphilic teleiophiles.

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EXHIBIT C

IQ, Handedness, and Pedophilia in Adult Male Patients Stratified by Referral Source

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Abstract This study investigated whether the previously observed association of pedophilia with lower IQs is an artifact of heterogeneity in referral source. The subjects were 832 adult male patients referred to a specialty clinic for evaluation of their sexual behavior. The patients' erotic preferences for prepubescent, pubescent, or adult partners were assessed with phallometric testing. Full scale IQ was estimated using six subtests from the WAIS-R. The results showed that the relations between pedophilia and lower IQ, lesser education, and increased rates of non-right-handedness were the same in homogeneous groups referred by lawyers or parole and probation officers as they were in a heterogeneous group referred by a miscellany of other sources. Those results, along with secondary analyses in the study, supported the conclusion that the relation between pedophilia and cognitive function is genuine and not artifactual. The findings were interpreted as evidence for the hypothesis that neurodevelopmental perturbations increase the risk of pedophilia in males.

Keywords Child pornography · Education · Handedness · IQ · Laterality · Pedophilia · Phallometry · Sexual abuse · Sexual offending · Sinistrality

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The term *pedophilia* may be defined as the erotic orientation of persons whose sexual attraction to prepubescent children exceeds their sexual attraction to pubescent or physically mature persons (Freund 1981). Similarly, the term *hebephilia* (Glueck 1955) refers to persons who are most attracted to pubescent children, and the term *teleiophilia* (Blanchard et al. 2000), to persons who are most attracted to physically mature adults.

Although most authorities are careful to define pedophilia in terms of erotic interest in prepubescent children (e.g., *DSM-IV-TR*; American Psychiatric Association 2000), the distinction between pedophilia and hebephilia is somewhat artificial. Many child molesters—sometimes called *pedohebephiles* (Freund et al. 1972)—approach both prepubescent and pubescent children. Such patterns of offending correspond with the realities of physical maturation. The external body shape changes gradually and continuously from childhood through puberty, adolescence, and maturity. Even the single most discrete, watershed event in either sex—menarche in females—produces no abrupt change in the individual's outward appearance.

For the sake of convenience and familiarity, we will refer to the clinically significant erotic preference for physically immature persons simply as pedophilia. Pedophilia is rare or nonexistent in women, and the word *pedophilia*, in this article, will always refer to a disorder of males. We will denote the full continuum of erotic preferences for physically immature, physically mature, and physically elderly persons as *erotic age-preference*, and the continuum of erotic preferences for males, both sexes, and females as *erotic gender-preference*.

The Neurodevelopmental Hypothesis of Pedophilia

Building on clinical and systematic observations going back more than a century (e.g., von Krafft-Ebing 1965), Blanchard et al. (2002) hypothesized that neurodevelopmental problems in prenatal life or early childhood increase the risk of pedophilia in males. If this hypothesis is correct, then pedophiles should show other signs of perturbed neurodevelopment.

Two such signs are of special interest, because both are associated with a very wide range of neurodevelopmental insults or stresses. The first such sign is poor cognitive function (or lower than expected IQ). The evidence that poor cognitive function can result from a variety of adverse neurodevelopmental events or conditions includes several lines of research. First, acquired neurologic damage during infancy or early childhood has profound and long-lasting cognitive effects. This has been demonstrated among children with brain tumors (Radcliffe et al. 1994), traumatic brain injury (Taylor et al. 1999), intracranial hemorrhage (Dennis and Barnes 1994), perinatal hypoxia (Gottfried 1973), and epilepsy (Neyens et al. 1999). Second, exposure to neurotoxic substances, either in utero or early in postnatal development, can have similar robust effects on cognition. Such effects have been associated with several teratogenic substances including lead (Needleman et al. 1990), coumarins (Wesseling et al. 2001), alcohol (Olson et al. 1998), and tobacco (Frydman 1996). Third, genetic disorders, with known adverse neurobiological effects, have also been connected with low cognitive functioning. For example, children with fragile X syndrome (Fisch et al. 1996),

velocardiofacial syndrome (Kozma 1998), and Down syndrome (Hayes and Batshaw 1993) typically demonstrate significant intellectual impairment.

The second nonspecific sign of neurodevelopmental problems in utero is non-right-handedness (i.e., left-handedness, or substantial use of both hands for common tasks, especially writing). Non-right-handedness occurs 1.5–3.0 times more frequently in populations with any of several neurological disorders. Such disorders include Down Syndrome (e.g., Batheja and McManus 1985), epilepsy (e.g., Schachter et al. 1995), autism (e.g., Soper et al. 1986), learning disabilities and dyslexia (e.g., Cornish and McManus 1996), and mental retardation (e.g., Grouios et al. 1999). Elevated levels of non-right-handedness have also been shown to be associated with biological stresses occurring pre- and perinatally, achieving frequencies of non-right-handedness comparable to those in the aforementioned pervasive developmental disorders (e.g., Searleman et al. 1988). Such pre- and perinatal stressors include premature birth (e.g., Marlow et al. 1989; Ross et al. 1992), twinning and multiple births (e.g., Coren 1994; Davis and Annett 1994; Williams et al. 1992), and low birth weight (e.g., O'Callaghan et al. 1987; Powls et al. 1996).

It must be stressed that Blanchard et al. (2002) did not hypothesize that poor cognitive functioning (or non-right-handedness) causes pedophilia. They predicted, rather, that pedophilia will correlate with poor cognitive functioning and non-right-handedness if neurodevelopmental problems predispose a male to develop all three. They also did not hypothesize that neurodevelopmental problems are the only causes of pedophilia—simply that they contribute to the risk of this disorder.

Empirical Findings on Pedophilia, IQ, and Handedness

For several years, we have been testing predictions from the hypothesis of Blanchard et al. (2000) in an ongoing research program. The main published studies are presented here. In the most comprehensive individual investigation of IQ in pedophiles published to date, Cantor et al. (2004) examined a heterogeneous group of 454 men undergoing clinical assessment for various sexual offenses or problematic interests. The sexological variables included the patients' numbers of victims in each of several age groups, their numbers of consenting adult sexual partners, and their penile responses in the laboratory to standardized stimuli depicting males and females of various ages (i.e., phallometric test results). Analyses revealed lower IQ scores to be related to greater numbers of child victims, and higher IQ scores to be related to greater numbers of consenting, adult sexual partners. Similarly, lower IQ scores were associated with greater phallometric responses to sexual stimuli involving children, and higher IQ scores were associated with greater responses to stimuli involving adults. The subjects also demonstrated significant group differences in IQ when trichotomized on the basis of their phallometric test results into pedophiles, hebephiles, and teleiophiles. The mean IQs of these groups were 89.5, 93.7, and 97.8, respectively. It should be noted that the pedophiles' mean IQ was not in the mentally retarded range, but it was two-thirds of a standard deviation lower than the population mean of 100.

The findings of Cantor et al. (2004) were supported by a subsequent meta-analysis of IQ data in sex offenders (Cantor et al. 2005a). This study, among other things,

compared the IQ scores of 56 samples of adult sexual offenders against children (3,187 individuals), 8 samples of sexual offenders against adults (302 individuals), and 53 samples of nonsexual offenders (16,222 men convicted of nonsexual crimes). The sexual offenders against children had significantly lower IQs than the nonsexual offenders; the sexual offenders against adults were intermediate. Cantor et al. (2005a) also found that the mean IQs of samples of sexual offenders against children were related to the criterion used for defining the offender's victim as a *child*: For example, the mean IQs from samples of men who offended against victims age 13 or younger were lower than the IQs from samples of men who offended against victims age 17 or younger.

The relation between handedness and pedophilia has been examined in three published studies. The first relevant data were produced by Bogaert (2001). He found a slightly but significantly higher rate of non-right-handedness in a sample of sexual offenders against (unrelated) children under age 12 compared with a sample of controls. Bogaert's finding was confirmed by Cantor et al. (2004) and Cantor et al. (2005b), who assessed pedophilic interest with more extensive offense-history data than was available to Bogaert and also with phallometric testing. Cantor et al. (2005b) found that the rate of non-right-handedness in pedophilic men was nearly triple that in teleiophilic men.

The Problem of Referral Bias

Although the measurements of IQ, handedness, and erotic age-preference taken in the authors' laboratory have used uniform methods, the sources of patient-referrals have been quite heterogeneous. This raises the possibility that the IQ difference that we have observed between pedophiles and teleiophiles has been over- or underestimated because of systematic differences in the sources of referrals for pedophiles or for teleiophiles. This notion is most easily explained with examples.

Suppose that institutions, agencies, or health workers involved in the care of mentally retarded persons are more likely to become concerned if a patient directs sexual behavior at children than if he directs such behavior at adults. This could result in a disproportionate number of referrals of patients who are both mentally retarded and pedophilic to our laboratory and thereby exaggerate the apparent difference in mean IQ between pedophiles and teleiophiles.

An alternative scenario could have the opposite effect of attenuating the true difference in IQ. Suppose that privately retained defense lawyers refer a disproportionate number of men with above-average IQs and pedophilic preferences. This is conceivable because of the currently aggressive prosecution of men for Internet child pornography, an offense that increases the likelihood that the offender is pedophilic (Seto et al. 2006) and that he is also above some minimum level of intelligence needed for computer literacy. Thus, the mixture of patients referred by defense lawyers with patients referred from other sources might decrease the difference in IQ that would occur in a uniformly ascertained sample of pedophiles and teleiophiles. The foregoing examples are merely two possibilities; there may be other sources of artifacts that the present writers have not even imagined.

Purpose and Approach of the Present Study

In our previous study of IQ in pedophilia (Cantor et al. 2004), we lacked a sufficient number of cases to divide patients according to the sources of their clinical referrals. The subsequent accumulation of additional cases made possible the present study, which investigated the relation of erotic age-preference to IQ and handedness in patient-groups homogeneous with regard to this variable.

In the present study, erotic age-preference was measured with phallometric testing, a procedure for assessing erotic interests in male adults and adolescents. In this procedure, the examinee's penile blood volume is monitored while he is presented with a standardized set of laboratory stimuli depicting a variety of potentially erotic activities or objects. The examinee's penile blood volume increases (i.e., degrees of penile erection) are taken as an index of his relative attraction to the different classes of stimuli. When phallometric testing is used to measure erotic age-preference, the laboratory stimuli include visual and auditory representations of children and adults.

Although the dependent variable in phallometric testing is usually described as "penile response," "penile circumference," "penile volume," or "penile erection," the goal of phallometry is not to study what happens with the penis, but rather to study what happens with the brain. At the time phallometry was invented, it was not possible to observe sexual response in the brain directly, so this was observed indirectly through changes in penile blood volume. It has recently been shown that functional magnetic resonance imaging (fMRI) of the brain can be used to observe differential sexual response to men vs. women directly (Ishai 2007; Ponseti et al. 2006; Safron et al. 2007), but this has not yet been demonstrated for differential sexual response to children vs. adults. Therefore phallometry is still the best laboratory technology available for assessing erotic age-preference. The correlations between phallometric results and victim-choice in the real world have been reported in previous studies from our laboratory (Blanchard and Barbaree 2005, pp. 452–453; Blanchard et al. 2001; Blanchard et al. 2006b).

Method

Subjects

Between January 2000 and April 2006, 1288 male patients referred to the Kurt Freund Laboratory of the Centre for Addiction and Mental Health (Toronto, Ontario, Canada) had both phallometric testing for erotic object (gender and age) preferences (Blanchard et al. 2001) and IQ testing as part of a brief neuropsychological screening battery (Cantor et al. 2004). The purpose of all referrals to the Laboratory was to identify the patient's primary erotic preferences. By default, this included assessment of erotic age-preference, because paraphilias tend to cluster, and because men who present with no known sexual offenses or offenses solely against adults sometimes prove to have an erotic preference for the immature phenotype. The Laboratory does not address forensic questions (e.g., criminal responsibility, fitness to stand trial), nor does it accept referrals concerning sexual disorders (e.g., erectile dysfunction, premature ejaculation).

We eliminated 81 subjects because their phallometric test results were spoiled by technical problems or their responses were too low (see Blanchard et al. 2001) and 9 subjects because tied scores in their phallometric results made it impossible to assign them to an age-preference group (see below). Another 23 subjects were eliminated because of missing data. From the remaining 1,175 subjects, we selected those who identified their race as white, learned English before the age of 6, were 18 years of age or older at the time of clinical assessment, and consented to the use of their assessment data for research purposes. Patients who learned English after age 6 were excluded because cognitive assessment conducted in a person's second or third language tends to underestimate global IQ. Patients who identified their race as something other than white were excluded out of concern that different racial communities might be over- or underrepresented among certain diagnostic groups for sociological reasons, thus creating a complex and difficult-to-analyze source of referral bias.

The 832 subjects finally selected for this study had a mean age of 39.40 years ($SD=12.45$), with a range of 18–74 years. The data of 288 of these were used in the previous study by Cantor et al. (2004).

Examination of the data on the sources of the patients' referrals revealed that two homogeneous groups of goodly size could be constructed. These were the 321 patients referred by their parole and probation officers and the 164 patients referred by their own lawyers. The remaining 347 patients were treated in this study as a miscellaneous group, and their referral source was designated as "Other." The other-referred group comprised patients referred by legal aid lawyers ($n=4$), by institutions ($n=211$), and by physicians ($n=132$). Neither of the two larger groups was really homogeneous. Referring institutions ranged from group homes for mentally retarded persons to regulatory bodies for health or educational professionals. The single largest subgroup, prisoners referred by correctional institutions ($n=105$), was not large enough for our purposes when other grouping variables and the resultant cell sizes for our planned analyses of covariance (see later) were taken into account. Careful consideration of the physician-referred group revealed that they were heterogeneous in a somewhat different way. Mentally retarded patients were referred by their physicians at the instigation of their families or other third parties, whereas the more intelligent patients typically initiated the referral themselves by asking their physicians to arrange a specialist consultation. Thus, the physician-referral routes for the more intelligent and the less intelligent patients were not really the same. For these reasons, and because we already had two homogeneous groups, we felt it was best to leave all the remainder in one large "other-referred" category.

As would be expected from the above-mentioned referral sources, the majority of patients had one or more sexual offenses. The phrase *sexual offenses*, in this article, includes charges, convictions, credible accusations, and self-disclosures of criminal sexual behavior. *Credible accusations* were defined by default, that is, all accusations excepting those that were made by an individual who stood to gain in some way from criminal charges against the accused, that had no corroborating evidence, and that were not voiced at the time the alleged offense or offenses occurred. Only a small proportion of accusations was not considered credible; typical examples were allegations, not followed by criminal charges, from estranged spouses in child custody-and-access disputes.

The subjects comprised approximately 9% with no known sexual offenses; 17% with offenses involving the possession, distribution, or manufacture of child pornography; 52% with offenses against children under age 12; 32% with offenses against pubescents age 12–14; 17% with offenses against teenagers age 15–16; and 24% with offenses against adults age 17 or older. These percentages add up to more than 100%, because many patients had offenses in more than one category. Offenses against adult victims included some that involved physical contact (e.g., rape, frotteurism) and others that did not (e.g., exhibitionism, voyeurism, obscene telephone calling). Men who had no involvement with the criminal justice system and who initiated referrals through their physicians included patients who were unsure about their sexual orientation, patients concerned about hypersexuality or “sex addiction,” patients experiencing difficulties because of their excessive use of telephone sex lines or massage parlors, clinically obsessive patients with intrusive thoughts about unacceptable sexual behavior, and patients with paraphilic behaviors like masochism, fetishism, and transvestism.

Materials and Measures

Sexual History

A standardized form, which has been employed in the Kurt Freund Laboratory since 1995, was used to record the patient's history of sexual offenses. Most of that information came from objective documents that accompanied his referral, for example, reports from probation and parole officers. The offense-history data were cross-checked against, and supplemented by, other information provided by the patient himself, including the number and nature of any additional sexual offenses that were admitted by the patient but for which he was never charged. The patient's information was solicited by the laboratory manager in a structured sexual history interview on the same day as phallometric testing.

Sexual offenses of particular interest in this study included those related to the possession or (rarely) manufacture of child pornography. Detailed information on the number of images involved was often not available. We therefore recorded this variable dichotomously, as present or not present. For purposes of this study, child pornography was scored as present if the patient had charges of this nature or if he admitted to the use of child pornography (or both).

Phallometric Measurement of Erotic Gender–Age Preferences

The Kurt Freund Laboratory is equipped for volumetric phallometry, that is, the apparatus measures penile blood volume change rather than penile circumference change. The volumetric method measures penile tumescence more accurately at low levels of response (Kuban et al. 1999). A photograph and schematic drawing of the volumetric apparatus are given in Freund et al. (1965). The major components include a glass cylinder that fits over the penis and an inflatable cuff that surrounds the base of the penis and isolates the air inside the cylinder from the outside atmosphere. A rubber tube attached to the cylinder leads to a pressure transducer, which converts air pressure changes into voltage output changes. Increases in penile

volume compress the air inside the cylinder and thus produce an output signal from the transducer. The apparatus is calibrated so that known quantities of volume displacement in the cylinder (e.g., 2 cc) correspond to known changes in transducer voltage output. The apparatus is very sensitive and can detect even the miniscule pulses of penile blood volume caused by the heartbeat.

The specific test used in this study has been described in detail by Blanchard et al. (2001). The test stimuli were audiotaped narratives presented through headphones and accompanied by slides. There were seven categories of narratives, which described sexual interactions with prepubescent girls, pubescent girls, adult women, prepubescent boys, pubescent boys, and adult men, and also solitary, nonsexual activities ("neutral" stimuli). All narratives were written in the second person and present tense and were approximately 100 words long. The narratives depicted fantasy situations in which sexual interaction with children would be relatively plausible or sexual interaction with adults would be relatively plausible as well as somatic and social attributes indicating the physical maturity of the imaginary target. This is illustrated by the following sample narratives, which are typical in tone and style.

Interaction with Prepubescent Female "Your neighbors' 7-year-old girl is staying overnight at your place. You tell her it is time to get ready for bed. She asks if you will come and tuck her in. When you go to her room, she is already between the covers. You bend over to kiss her on the forehead, but she wraps her arms around your neck and pushes her mouth against yours. Giggling, she throws back the covers to show you she is naked. You sink to the bed, tenderly pressing your lips against the little groove between her legs."

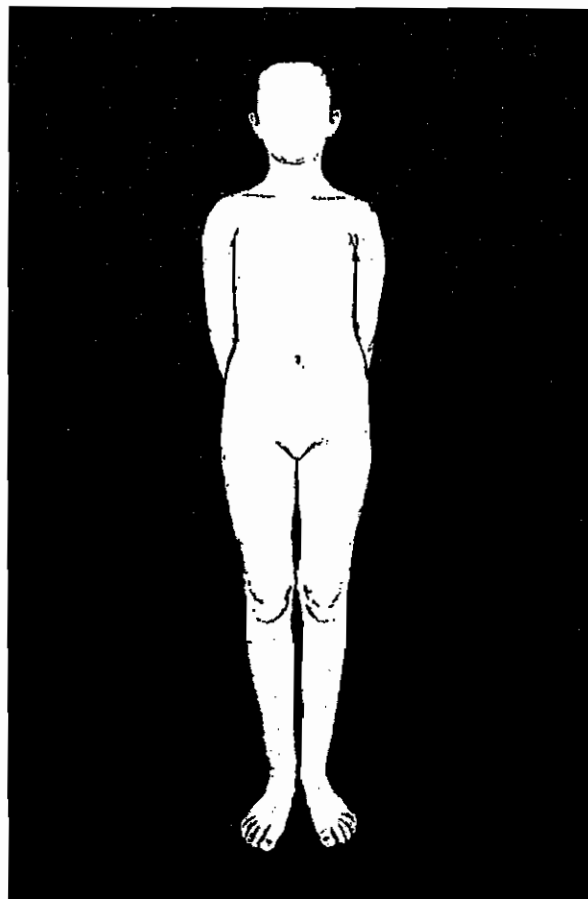
Interaction with Adult Male "The gymnasium has nearly emptied by the time you head for the showers. Only one man still remains in the shower room. His muscles ripple as he rubs the soap across his chest and under his arms. He notices you admiring him. He turns toward you a little as he begins lathering himself between the legs. You turn on the shower next to his. Clouds of steam rise around the two of you. He has become fully hard. You move together at the same instant. Your hot soapy bodies slide easily against one another. Your penis rubs against his."

The narratives describing heterosexual interactions were recorded with a woman's voice, and those describing homosexual interactions, with a man's. Neutral stimuli were recorded with both.

Each test trial consisted of one narrative, accompanied by photographic slides on the three adjacent projection screens, which simultaneously showed the full-length front view, full-length rear view, and close-up genital region of a nude model who corresponded in age and gender to the topic of the narrative. Figure 1 illustrates the standard pose used for the full-length front views. Each trial included three nude models, each presented for 18 s. Therefore the total duration of a trial was 54 s, during which the examinee viewed a total of nine slides, three at a time. Neutral narratives were similarly accompanied by slides of landscapes.

The full test consisted of four blocks of seven trials, with each block including one trial of each type in fixed, pseudorandom order. Although the trial length was fixed, the intertrial interval was variable, lasting as long as necessary for penile blood volume to return to baseline. The time required to complete the test was

Fig. 1 The standard pose used for the full-length front views, illustrated with a pubescent female. The girl herself has been erased from the photograph for the purpose of this article; thus the figure shows the pose but not the model. The (undoctored) image would be presented as one of a set of three (front view, rear view, genital close-up), on three projection screens arranged in the manner of a triptych. As illustrated in the figure, the models are posed in a manner resembling illustrations in a medical text. There is no relation between the uniform, static poses of the models and the various activities described in the accompanying narratives. A female model in this age range would be accompanied by a narrative of the following type: "You are watching a late movie on TV with your neighbors' 12-year-old daughter. You have your arm around her shoulders, and your fingers brush against her chest. You realize that her breasts have begun to develop..."



usually about 1 h. All phallometric tests in this study were administered by the same individual, a full-time staff member of the laboratory.

Two kinds of scores, representing the amount of responding and the direction of responding, were calculated from the raw phallometric data. The amount of responding was quantified with a standard measure in the Kurt Freund Laboratory, the *output index* or *OI* (Freund 1967). This is the average of the three greatest responses to any stimulus category except "neutral," where penile response is expressed in cubic centimeters (cc) of blood volume increase from the start of a trial. Tests are considered invalid if the patient's *OI* is less than 1.0 cc. As measured by the Laboratory's equipment, full erection for the average patient corresponds to a blood volume increase of 20–30 cc. That is the blood volume increase for the portion of the penis that projects into the glass cylinder, the only portion that we can measure.

The assessment of response direction in the Kurt Freund Laboratory involves several steps. This process, whose calculations and rationale have been presented at length by Blanchard et al. (2001), may be briefly explained as follows. During the stimulus trials, penile blood volume change is sampled four times per second and recorded as a curve of blood volume change over time. The examinee's response during a given trial is

measured in two ways: (a) as the maximum deflection of the curve (i.e., the greatest departure from initial value occurring during the 54 s of the trial), and (b) as the area under the curve. Each examinee's 28 deflection scores are converted into standard scores, based on his own deflection data (in other words, they are converted into ipsative *z* scores), and the same operation is carried out on his area scores. Next, for each examinee, the standardized deflection and standardized area scores are averaged to yield a separate composite score for each of the 28 trials. Finally, the data are reduced to seven scores for each examinee by averaging his four composite scores in each of the seven stimulus categories. These seven *category scores* are taken as measures of the examinee's relative erotic interest in adult women, pubescent girls, prepubescent girls, and so on.

For purposes of the present study, the sample was divided into three groups, using the category scores described above. The men who had a greater penile response to laboratory stimuli depicting prepubescent males or females than to stimuli depicting pubescent or adult persons were designated the *pedophilic* group. The men who had a greater response to pubescent males or females than to other stimuli were designated the *hebephilic* group, and the men who had a greater response to adult males or females than to other stimuli were designated the *teleiophilic* group. This procedure classified 106 men as pedophiles, 340 as hebephiles, and 386 as teleiophiles. In the results to follow, we will refer to this variable (i.e., the classification of subjects as pedo-, hebe-, or teleiophilic) as *phallometric diagnosis*; however, it should be noted that our laboratory uses more stringent criteria—which minimize false positive diagnoses, possibly at the expense of overall accuracy—for clinical diagnosis (Blanchard et al. 2001).

Measures of Cognitive Functioning

The patients' sexological assessments were supplemented by a brief neuropsychological screening battery (see Cantor et al. 2004, for further details). The battery included six subtests from the Wechsler Adult Intelligence Scale-Revised (WAIS-R; Wechsler 1981): Information, Similarities, Digit Span, Arithmetic, Picture Completion, and Block Design. Full scale IQ (FSIQ) was estimated from the subtests by the method detailed by Tellegen and Briggs (1967), using the age-scaled subtest scores and the intercorrelations between those subtests in the WAIS-R standardization sample.

In this study, handedness was assessed with a single item from the Edinburgh Handedness Inventory (Oldfield 1971; Williams 1986): "Which hand do you write with?" We classified patients dichotomously as right-handed or non-right-handed. Patients who indicated an equal preference for writing with their left or right hands were classified as non-right-handed.

Results

Relations Among Independent Variables

Our key research questions were addressed in a series of analyses in which the dependent variables were IQ, education, and handedness, and the independent variables

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Table 1 Cross-tabulation of phallometric diagnosis and referral source for subjects with and without child pornography: numbers of subjects

Child pornography	Phallometric diagnosis	Referral source		
		Parole and probation	Patient's lawyer	Other
Absent	Pedophiles	36	15	30
	Hebephiles	98	42	118
	Teleiophiles	137	59	153
Present	Pedophiles	12	5	8
	Hebephiles	26	28	28
	Teleiophiles	12	15	10

were phallometric diagnosis, referral source, and child pornography. Before the key questions were addressed, however, the relations among the independent variables were examined in a set of preliminary analyses.

Table 1 shows the number of subjects for each combination of values on the three independent variables. Among the subjects with no known history of child pornography, there was no association between phallometric diagnosis and referral source, $\chi^2(4, n=688)=1.91, p=0.75$. The same was true for the subjects who were charged with, or had admitted to, the use of child pornography, $\chi^2(4, n=144)=3.87, p=0.42$.

There was an association between child pornography and the other two variables. This was revealed by a logistic regression analysis, in which child pornography (scored 0 for absent and 1 for present) was the criterion variable, and phallometric diagnosis and referral source were the predictor variables. The two predictor variables were indicator-coded; the reference group was teleiophiles for phallometric diagnosis and "other" for referral source. The results (Table 2) showed that both the pedophiles and the hebephiles had approximately three times higher odds of child pornography use than the teleiophiles (see column headed e^B , which contains the odds ratios.) This result confirmed a previous finding obtained with an overlapping subset of patients from our laboratory's database (Seto et al. 2006) and should not be regarded as a novel finding. The results also showed that patients referred by their own lawyers had almost three times higher odds of child pornography use than did the miscellaneous "other" group.

IQ, Education, and Handedness

Figure 2 shows the mean IQs of the subjects divided according to phallometric diagnosis. The mean IQ for the teleiophiles was virtually identical to the expected

Table 2 Logistic regression of child pornography on phallometric diagnosis and referral source

Predictor	B	SE	Wald	df	p	e^B
Phallometric diagnosis			28.34	2	<0.0001	
Pedophiles vs. teleiophiles	1.09	0.29	13.95	1	0.0002	2.97
Hebephiles vs. teleiophiles	1.11	0.22	26.27	1	<0.0001	3.04
Referral source			20.12	2	<0.0001	
PPO vs. "other"	0.19	0.23	0.72	1	0.40	1.21
Lawyer vs. "other"	1.02	0.24	18.22	1	<0.0001	2.77

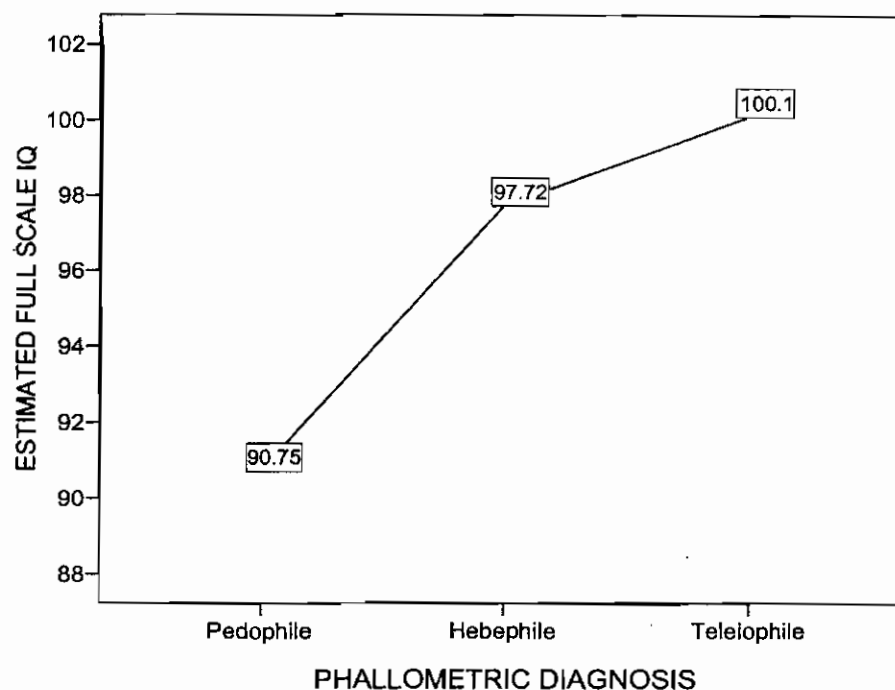


Fig. 2 Estimated full scale IQ as a function of phallometric diagnosis

value for the general population. As in our previous sample from this database (e.g., Cantor et al. 2004), the mean IQ of the pedophiles was about two-thirds of a standard deviation below that of the teleiophiles, and the mean IQ of the hebephiles fell in between.

Figure 3 shows the mean IQs of the subjects divided according to phallometric diagnosis, referral source, and child pornography. These means were compared in an analysis of covariance (ANCOVA), in which IQ was the dependent variable; phallometric diagnosis, referral source, and child pornography were the independent variables; and the patient's age at examination was the covariate. The numbers of subjects in each cell of the $3 \times 3 \times 2$ design correspond to the numbers already presented in Table 1. The results of the ANCOVA are shown in Table 3.

Older patients tended to have higher IQs. It is not clear why this was the case. It may be some subtle artifact related to the routes by which patients arrive at our laboratory. That hypothesis would require a complex study in its own right.

The phallometric diagnosis variable (pedo-, hebe-, or teleiophile) was statistically significant, but the referral source variable (parole and probation, lawyer, or other) was not. The child pornography variable was highly significant. The direction of the effect can be seen clearly in Fig. 3: The mean IQs of patients who had been charged with, or admitted to, the use of child pornography (right-hand panel) were generally higher than the means of patients with no such history (left-hand panel).

The main purpose of this study was to investigate the possibility that the association of pedophilia with lower IQs is an artifact of heterogeneity in referral

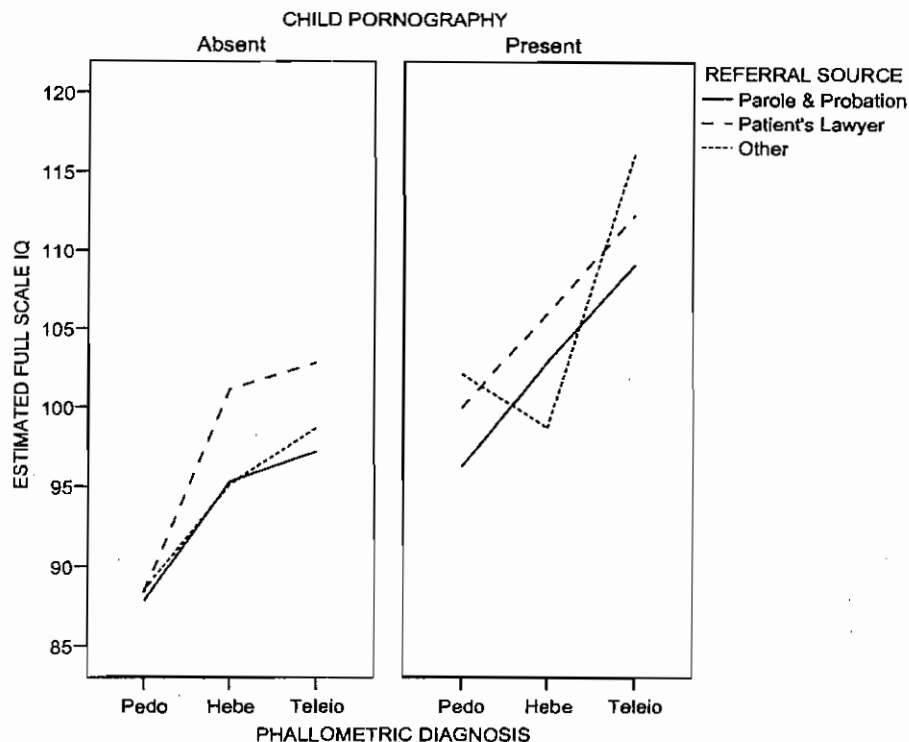


Fig. 3 Estimated full scale IQ as a function of phallometric diagnosis, referral source, and child pornography. *Pedo* pedophile, *Hebe* hebephile, *Teleio* teleiophile

source. If this were true, then the relation between pedophilia and IQ should be absent in groups who are homogeneous in regard to referral source, or at least weaker than it is in subjects who are heterogeneous in this regard. In statistical terms, this means that the slopes of the lines relating IQ to phallometric diagnosis in our two homogeneous groups should be flatter than the slope in our heterogeneous group (cf. solid and dashed lines in Fig. 3 vs. the dotted line).

Table 3 Analysis of covariance for estimated full scale IQ

Independent variables and covariate(s)	<i>F</i>	<i>df</i>	<i>p</i>
Age at examination	56.11	1	<0.0001
Phallometric diagnosis	17.01	2	<0.0001
Referral source	2.54	2	0.08
Child pornography	47.45	1	<0.0001
Phallometric diagnosis × referral source	1.01	4	0.40
Phallometric diagnosis × child pornography	3.60	2	0.03
Referral source × child pornography	0.53	2	0.59
Phallometric diagnosis × referral source × child pornography	0.66	4	0.62
Error		813	
Total		832	
Corrected total		831	

The formal test for a difference of slopes in our ANCOVA was the interaction term, phallometric diagnosis \times referral source. The corresponding p value in Table 3 shows that this interaction did not even approach statistical significance. In other words, the relation between pedophilia and IQ was the same among patients referred by parole and probation officers, patients referred by their own lawyers, and patients referred by a miscellany of other sources. Thus, the results of this ANCOVA provided no evidence that the previously observed association of pedophilia with lower IQs was artifactually produced by heterogeneity in referral sources.

Visual inspection of Fig. 3 shows that there was one slightly discrepant data point, namely, the mean IQ of the phallometrically diagnosed hebephiles with child pornography use who were referred by "other" (i.e., miscellaneous) sources. It is a little lower than one would expect from the overall pattern. This discrepant point, which almost certainly represents nothing but sampling error, is responsible for the significant phallometric diagnosis \times child pornography interaction. The remaining two interactions shown in Table 3 were not statistically significant and are of no theoretical interest.

Figure 4 shows that the average teleiophile in our study had a high school education, whereas the average pedophile did not complete high school. This result is congruent with previous findings from our laboratory computed on the same database (Cantor et al. 2006). The mean years of education for subjects with all 18 possible combinations of phallometric diagnosis, referral source, and child pornography use are plotted in Fig. 5. As one would expect, the pattern of data in Fig. 5 is quite similar to the pattern in Fig. 3, including the one discrepant group.

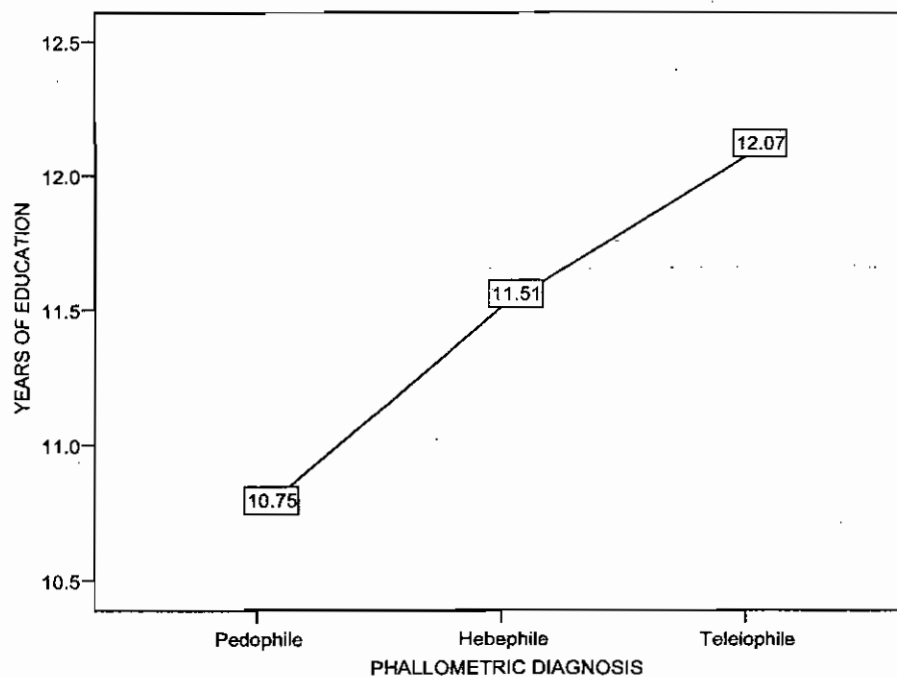


Fig. 4 Years of education as a function of phallometric diagnosis

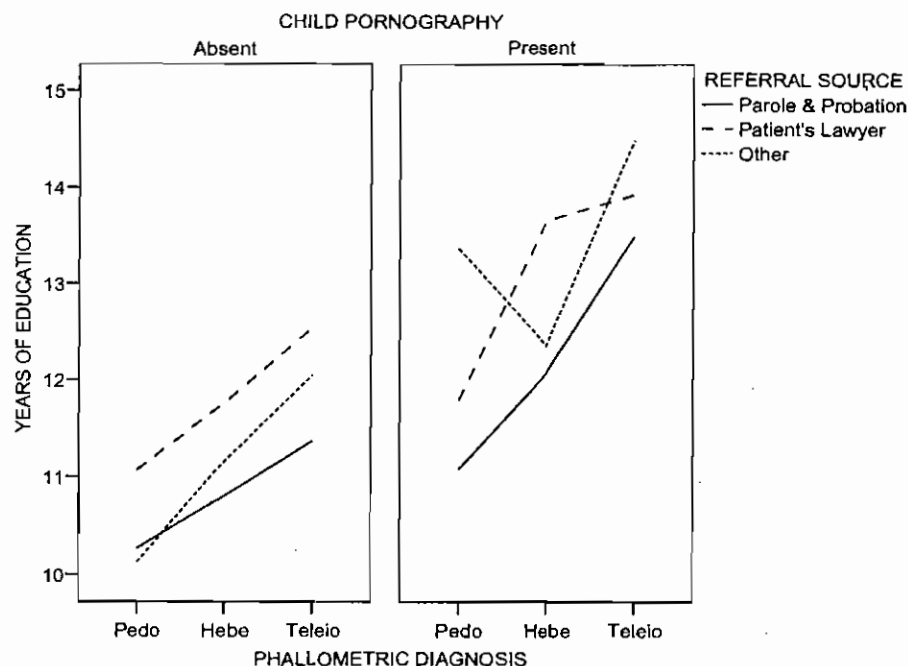


Fig. 5 Years of education as a function of phallometric diagnosis, referral source, and child pornography

The data were analyzed in an ANCOVA similar to that used for estimated full scale IQ (see Table 4). There were three statistically significant results. The first of these was the already noted main effect for phallometric diagnosis. The second was a small effect for referral source: Patients referred by their lawyers had the most education, and patients referred by their parole and probation officers had the least. The third was the main effect for child pornography, which showed that patients who had been charged with, or admitted to, the use of child pornography had more years of education than patients without such a history.

Table 4 Analysis of covariance for years of education

Independent variables and covariate(s)	F	df	p
Age at examination	2.02	1	0.16
Phallometric diagnosis	10.07	2	<0.0001
Referral source	3.90	2	0.02
Child pornography	30.99	1	<0.0001
Phallometric diagnosis × referral source	0.79	4	0.53
Phallometric diagnosis × child pornography	0.45	2	0.64
Referral source × child pornography	1.08	2	0.34
Phallometric diagnosis × referral source × child pornography	1.19	4	0.31
Error		813	
Total		832	
Corrected total		831	

One of the nonsignificant results, the interaction of phallometric diagnosis \times referral source, is notable insofar as it reinforces the conclusion that the association of pedophilia with lower IQs is not an artifact of heterogeneity in referral source. The remaining nonsignificant results are of no theoretical interest.

Because handedness was treated as a dichotomous variable in this study, it was plotted and analyzed somewhat differently than were IQ and years of education. Figure 6 shows the percentages of non-right-handed (left-handed or ambidextrous) pedophiles, hebephiles, and teleiophiles. The rate of non-right-handedness for the teleiophiles was very close to estimates of non-right-handedness for the general adult population (see Hardyck and Petrino 1977, for a review). As in our previous studies with subsets of these patients (Cantor et al. 2005b), the rate for pedophiles was markedly higher.

Figure 7 shows the more detailed breakdown of patients by phallometric diagnosis, referral source, and child pornography. There is again only one group who departed slightly from the general pattern, probably because of sampling error. Those were the hebephiles with child pornography who were referred by their lawyers; this group had a slightly lower rate of non-right-handedness than one would expect from the overall pattern.

The data were analyzed in a logistic regression analysis. The criterion variable was handedness, scored 0 for right-handed and 1 for non-right-handed. There were two continuous predictor variables (age and IQ) and three categorical predictor variables (phallometric diagnosis, referral source, and child pornography). The three categorical predictors were indicator-coded; the reference category was teleiophiles for

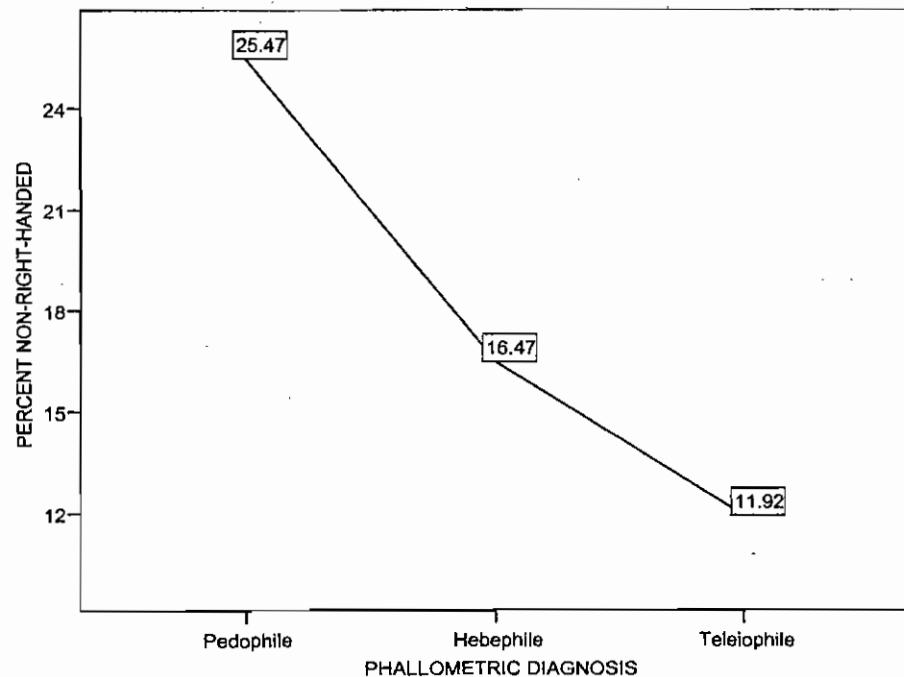


Fig. 6 Percentage of non-right-handed men as a function of phallometric diagnosis

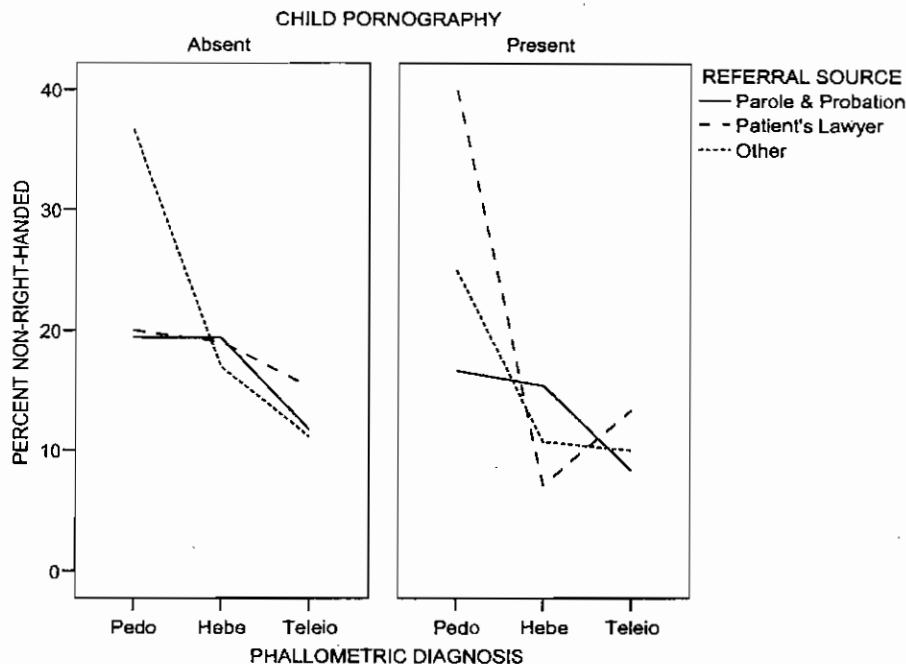


Fig. 7 Percentage of non-right-handed men as a function of phallometric diagnosis, referral source, and child pornography

phallometric diagnosis, "other" for referral source, and "absent" for child pornography. The model was built in two steps. Age, IQ, phallometric diagnosis, referral source, and child pornography were entered in Step 1. The interaction terms—phallometric diagnosis \times referral source, phallometric diagnosis \times child pornography, and referral source \times child pornography—were entered in step 2. The results are presented in Table 5.

Table 5 Logistic regression of non-right-handedness on child pornography, phallometric diagnosis, and referral source

Step	Predictor	B	SE	Wald	df	p	e ^B
1	Age at examination	-0.03	0.01	11.30	1	0.0008	0.97
	Estimated full scale IQ	-0.01	0.01	4.41	1	0.04	0.99
	Phallometric diagnosis			9.32	2	0.009	
	Pedophiles vs. teleiophiles	0.87	0.29	8.92	1	0.003	2.38
	Hebephiles vs. teleiophiles	0.42	0.22	3.57	1	0.06	1.52
	Referral source			0.57	2	0.75	
	PPO vs. "other"	-0.03	0.22	0.02	1	0.88	0.97
	Lawyer vs. "other"	0.17	0.27	0.38	1	0.54	1.18
	Child pornography	-0.32	0.29	1.21	1	0.27	0.73
2 ^a	Phallometric diagnosis \times referral source			5.09	4	0.28	
	Phallometric diagnosis \times child pornography			0.63	2	0.73	
	Referral source \times child pornography			0.29	2	0.86	

^a Only interaction terms from the second model are reported

Age was negatively associated with non-right-handedness, that is, older subjects were less likely to be non-right-handed. IQ was also negatively associated with non-right-handedness; more intelligent subjects in this sample were slightly less likely to be non-right-handed. Both effects have previously been observed in this database (Cantor et al. 2005b).

The main effect for phallometric diagnosis was significant; the contrast results showed that the odds a pedophile would be non-right-handed were more than twice the odds that a teleiophile would be non-right-handed. Handedness was not related to referral source or to child pornography.

None of the interaction terms was significant (see "step 2" in Table 5). Only one of these negative results was of interest. The negative result for the phallometric diagnosis \times referral source interaction indicated that the previously reported association of pedophilia with non-right-handedness was not an artifact produced by heterogeneity in referral sources.

Output Index

The subject's amplitude of response (output index or OI) is another parameter of phallometric test performance that is potentially related to the variables under investigation. Differences in OI between groups or between individuals could reflect at least three different things: (1) differences in general sexual arousability, (2) differences in sexual response to audiovisual representations of sexual objects or situations (as opposed to real-life partners and encounters), and (3) differences in motivation to suppress responding to the test stimuli. The third possibility is tantamount to the notion that differences in OI might relate to motivation to influence phallometric diagnosis. That is because most efforts to manipulate the outcome of phallometric testing consist of suppressing responses to arousing but socially undesirable stimuli (e.g., children) rather than augmenting responses to uninteresting but socially desirable stimuli (e.g., adults), probably because the latter strategy is more difficult (Adams et al. 1992; Mahoney and Strassberg 1991). We therefore explored the relations between the variables of interest and OI to see whether the results suggested any additional ways in which the association of pedophilia and low IQ might be artifactually produced.

The mean OIs of the pedophiles, hebephiles, and teleiophiles are shown in Fig. 8; the more detailed breakdown is shown in Fig. 9. The statistical analysis used an ANCOVA similar to those used to investigate IQ and years of education. The only differences (apart, of course, from the dependent variable) were in the covariates. The inverse of age at examination ($1/\text{age}$) was used instead of age at examination because previous research has shown that the decline of penile response with advancing age is nonlinear (Blanchard and Barbaree 2005). Estimated full scale IQ was added as a second covariate because that was a convenient way to assess the relation between global intelligence and OI.

The results (Table 6) showed the expected large decline in penile response with advancing age. The possible psychological and medical reasons for this have been discussed elsewhere (Blanchard and Barbaree 2005). The only significant variable, besides age, was referral source. The lawyer-referred group had the lowest mean OI. This result was comprehensible, given that these men had cases currently before the courts and thus the most reason for concern about their phallometric test results.

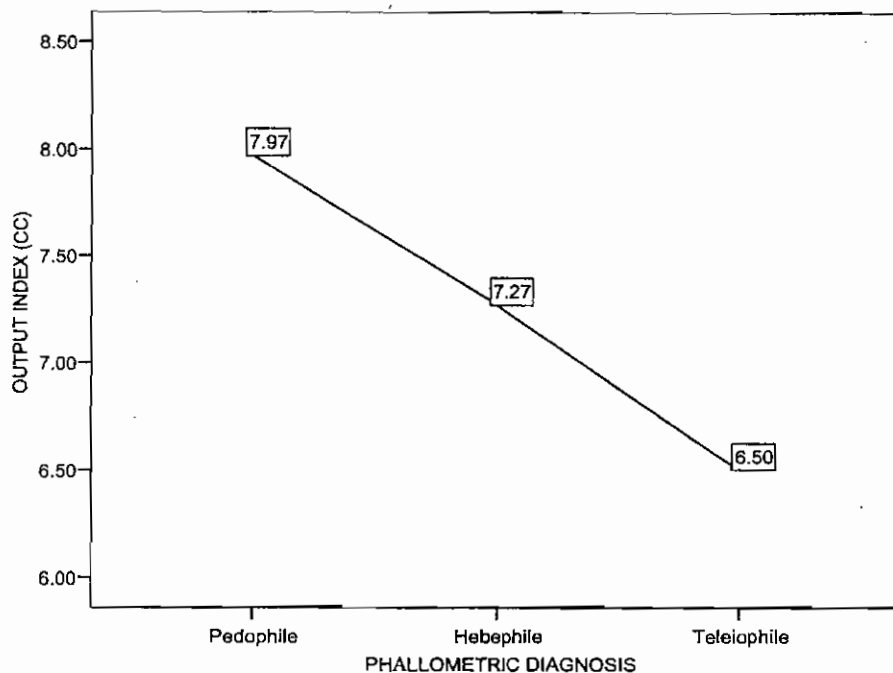


Fig. 8 Output index as a function of phallometric diagnosis. The metric for output index is the change in penile blood volume from the start of a trial, where blood volume is measured in cubic centimeters (cc). See text for further explanation

Two of the negative findings were noteworthy. First, there was virtually zero relation between OI and IQ. More intelligent and less intelligent patients had almost precisely the same degree of penile response. Second, there was virtually zero relation between OI and child pornography offenses. Men who had risked arrest and conviction to obtain representations of nude children or sexually behaving children in real life did not respond more to such representations in the laboratory. In summary, the findings for OI were somewhat unexpected as well as interesting in their own right, but they did not provide any clues as to a possible artifactual origin of the pedophilia–IQ relation.

Successful Faking by Intelligent Pedophiles as a Source of Artifacts

Suppose that more intelligent pedophiles are better able to fake a diagnosis of teleiophilia on the phallometric test. In that case, the apparent association between phallometrically assessed pedophilia and lower IQ might be merely an artifact arising from more successful faking of normal age-preference by more intelligent pedophiles. One way to evaluate this possibility is to select a subgroup of men who are almost certainly pedophiles according to their sexual histories, and then determine whether those who produce a diagnosis of teleiophilia on the phallometric test have higher IQs. That was the strategy used in the final analysis of the present study.

There is no gold standard for identifying men who are certain or almost certain to be pedophiles. For this study, we used the following criteria, which were based on the subject's self-reported sexual offenses as well as his criminal charges: (1) the

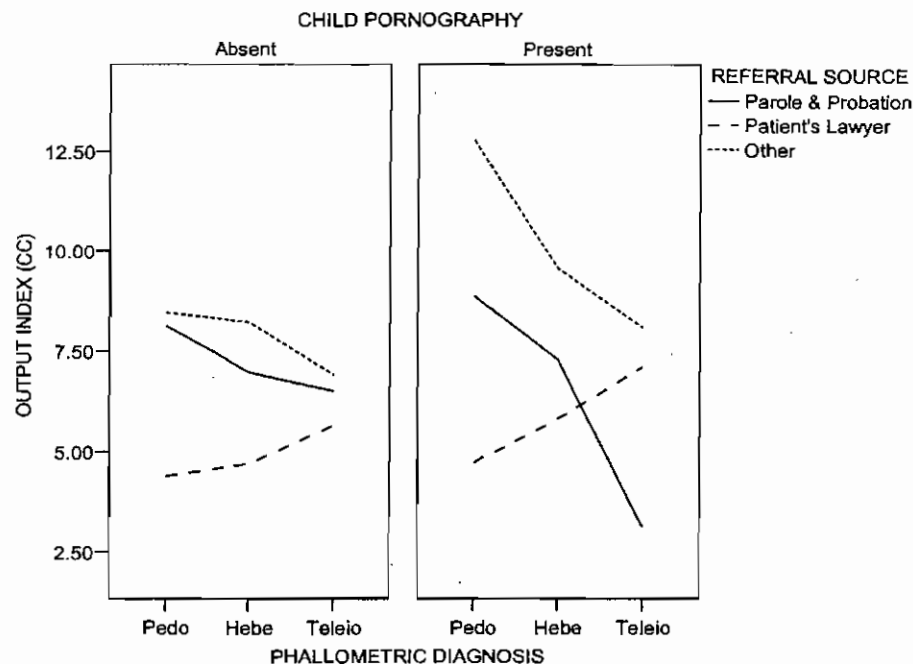


Fig. 9 Output index as a function of phallometric diagnosis, referral source, and child pornography. The metric for output index is the change in penile blood volume from the start of a trial, where blood volume is measured in cubic centimeters (cc). See text for further explanation

patient offended against three or more different children under the age of 12 years, (2) the patient offended against fewer than three children aged 12–14 years, (3) the patient offended against no person over the age of 15 years, and (4) the patient was not charged with, and did not admit to, any activities related to child pornography.

Table 6 Analysis of covariance for output index on the phallometric test

Independent variables and covariate(s)	F	df	p
Inverse of age (1/age)	139.52	1	<0.0001
Estimated full scale IQ	0.01	1	0.94
Phallometric diagnosis	1.22	2	0.30
Referral source	7.10	2	0.0009
Child pornography	0.25	1	0.62
Phallometric diagnosis × referral source	1.06	4	0.38
Phallometric diagnosis × child pornography	0.40	2	0.67
Referral source × child pornography	0.74	2	0.48
Phallometric diagnosis × referral source × child pornography	0.53	4	0.71
Error		812	
Total		832	
Corrected total		831	

The last criterion was not used to identify subjects as pedophilic but rather to simplify the relation between pedophilia and IQ. These relatively stringent criteria identified 56 men as highly probably pedophilic according to their sexual histories. They were not all phallometrically diagnosed as pedophilic, however: 16 were phallometrically diagnosed as pedophiles, 26 as hebephiles, and 14 as teleiophiles.

The mean IQs of the three groups are shown in Fig. 10. The scale for the Y-axis was chosen to make this figure directly comparable with Fig. 2. An ANCOVA with age at examination as the covariate and phallometric diagnosis as the only independent variable showed that the differences among mean IQs were not statistically significant, $F(2, 52)=0.16$, $p=0.85$. Thus, it is not clear how or why 14 men with extensive histories of sexual offending against prepubescent children produced a phallometric diagnosis of teleiophilia, but the patient's IQ does not appear to have been a factor in this outcome. It is possible that these 14 men truly were teleiophilic, and it is also possible that cognitive abilities unrelated to global IQ enable some men to control sexual responding in the laboratory better than others. In any event, the results did not support the hypothesis that the apparent association between phallometrically assessed pedophilia and lower IQ is merely an artifact arising from more successful faking of teleiophilic age-preference by more intelligent pedophiles.

We repeated this analysis including 13 men who had been screened out of the previous analysis because they had child pornography charges. The results were similar and generated the same conclusion.

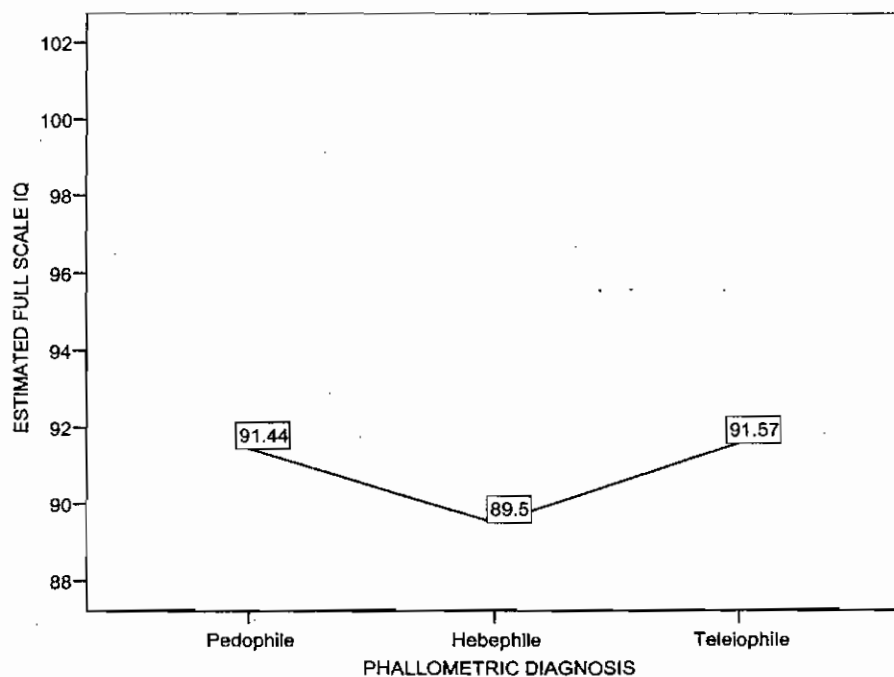


Fig. 10 Estimated full scale IQ as a function of phallometric diagnosis for men with sexual offenses against three or more prepubescent children

Discussion

This study yielded no evidence that the previously observed relation between pedophilia and cognitive function is an artifact of sample heterogeneity. The relations between pedophilia and lower IQ, lesser education, and increased rates of non-right-handedness were the same in homogeneous groups referred by lawyers or parole and probation officers as they were in a heterogeneous group referred by a miscellany of other sources.

The study also produced no evidence that the relation between pedophilia and cognitive function is an artifact arising from the successful faking of teleiophilia by more intelligent pedophiles. The analysis of phallometric output index found no correlation between IQ and suppression of penile responding, which probably means that there is no correlation between IQ and attempting to manipulate the outcome of the phallometric test. The analysis of IQ in very probable pedophiles (men with multiple sexual offenses against prepubescent children) found no tendency for those who produced phallometric diagnoses of teleiophilia to have higher IQs than those who produced diagnoses of pedophilia or hebephilia. It therefore appears that IQ correlates neither with the attempt to manipulate phallometric test outcome nor with pedophiles' success in doing so. The latter finding was unexpected, because IQ correlates with success in a wide variety of endeavors (although this may be less true for tasks involving emotional control). This finding should, at any rate, be reexamined in future research.

A few miscellaneous findings were of some interest. The results of the output index analysis demonstrated that appropriately motivated subjects can and do suppress responding on the phallometric test, whether they do this using global intelligence or some other cognitive ability. The evidence for this conclusion is that the lawyer-referred group, who had cases currently before the courts and the most reason for concern about their phallometric diagnoses, had the lowest mean OI.

Another noteworthy finding from the output index analysis is the complete absence of any relation between OI and child pornography offenses. Thus, men who had risked arrest and conviction to obtain representations of nude children or sexually behaving children in real life did not respond more to such representations in the laboratory.

The child pornography offenders were distinct in other regards, however. The results showed that they were more intelligent, better educated, and more likely to be referred by their lawyers than our other patients. This result indicates that it will be important for future researchers to take the variable of child pornography use into account in many types of studies involving pedophilia.

The analyses of IQ, education, and handedness showed that the hebephiles' mean scores fell in between the pedophiles' and teleiophiles' mean scores in every instance. These results raise the question, which we alluded to earlier in the text, of whether erotic age-preference is taxonomic or continuous. In other words, do pedophiles and teleiophiles differ in kind or in degree? This matter should eventually be addressed in a statistically rigorous manner, because meaningful classification is the basis of all clinical research.

For reasons explained earlier in the text, the finding that pedophiles tend to have lower IQs and higher rates of non-right-handedness suggests that neurodevelopmental perturbations increase the risk of pedophilia in males. If this conclusion is true, it has profound theoretical implications. For many decades, anomalous sexual behavior has been widely viewed as the product of anything but anomalous brain development:

classical conditioning, operant conditioning, psychodynamic processes, sexual politics, deficient social skills, re-enactment of childhood traumas, and so on. In this context, the simple proposition that abnormal brains may produce abnormal sexual behavior is a relatively radical one, with the potential to energize a whole new generation of more sophisticated and more powerful research studies. With the advent of modern brain imaging technologies, we may soon see a wave of studies that address this question directly.

There are three notable things that this study did not do and that it did not set out to do. First, it did not rule out the possibility that early experiences, either by themselves or in combination with neurodevelopmental factors, may also increase the risk of pedophilia. The various psychosocial theories of pedophilia have recently been reviewed by Seto (2007).

Second, it did not narrow down the extremely wide range of different brain abnormalities that could conceivably predispose males to this paraphilia. That question was addressed more directly by previous neuropsychological research from our laboratory (Cantor et al. 2004), which analyzed more specific measures of intelligence and memory. That research suggested that pedophiles' below-median intelligence is related to generalized rather than specific cognitive deficits. The conclusion of Cantor et al. (2004) was somewhat provisional, because those authors used a brief neuropsychological screening battery rather than a comprehensive neuropsychological assessment, and it is therefore possible that they did not detect areas of preserved cognitive ability or areas with more severe deficit. The conclusion of Cantor et al. (2004), however, was bolstered by a subsequent review of published studies meant to detect specific cognitive deficits (Blanchard et al. 2006a). The notion that functional brain deficits are not localized in pedophilia parallels the notion that structural brain deficits are not localized in other psychiatric disorders (schizophrenia and mood disorders): "It is becoming increasingly evident that a lesion model is inappropriate and that a more relevant characterisation will be found in terms of disorders of functional interconnections between brain regions" (Frith and Dolan 1998, p. 259).

Third—and most important to stress—the present study did not identify new diagnostic indicators of pedophilia. The statistical relations of IQ and handedness to pedophilia, although valuable as potential clues to the etiology of this disorder, are far too small to permit these variables to be used as diagnostic indicators.

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EXHIBIT D

Grade Failure and Special Education Placement in Sexual Offenders' Educational Histories

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A sample of 701 adult men underwent assessment following illegal or clinically significant sexual behaviors or interests. Patients were categorized on the basis of phallometric (penile) responses in the laboratory to erotic stimuli depicting adults, pubescent children, and prepubescent children; histories of sexual offenses; and self-reported sexual interests. Comprising the categories were men sexually interested in prepubescent children (*pedophiles*; $n = 114$), men sexually interested in pubescent children (*hebephiles*; $n = 377$), men sexually interested in adults and who had committed a sexual offense against an adult (*teleiophilic offenders*; $n = 139$), and men sexually interested in adults and who had no known history of any sexual offenses (*teleiophilic nonoffenders*; $n = 71$). Patients' assessments included IQ testing and self-reported academic history, which included any grade failures and assignment to special education classes. Relative to the teleiophilic offenders, both the pedophilic and the hebephilic groups showed approximately double the odds of failing a grade or being enrolled in special education, both before and after covarying IQ. No significant differences were detected between the teleiophilic offenders and the teleiophilic nonoffenders. These data are consistent with the hypothesis that an erotic age preference for children sometimes results from a perturbation of neurodevelopment occurring early in life.

KEY WORDS: academic achievement; neuropsychology; pedophilia; phallometry; grade failure; sexual abuse; special education; sex offenders.

INTRODUCTION

The hypothesis that pedophilic⁴ men suffer from a disorder of brain function dates back to the nineteenth century (e.g., von Krafft-Ebing, 1886/1965), and quantitative indications that men who commit sexual offenses against children score lower on standardized tests of intellectual capacity than do comparison groups began appearing early in the twentieth century (e.g., Frank, 1931). In

the present investigation, we sought to ascertain whether pedophilic or hebephilic⁵ men differ from teleiophilic⁶ men on other indicators of poor intellectual capacity: histories of failing grades in school and histories of requiring placement in special education classes.

Our prior analysis of a contemporary sample of pedophilic and hebephilic men demonstrated that they do indeed have lower IQs than teleiophilic men (Cantor et al., 2004). Taken by itself, the IQ difference between these groups might be plausibly explained as the result of an ascertainment bias: The pedophilic and hebephilic men most likely to be apprehended and convicted (and, thus, subject to sampling by researchers) might be those with the lowest IQs. Arguing against that explanation, however, is that pedophilic and hebephilic men also

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⁴*Pedophilia* is the erotic interest in prepubescent children (von Krafft-Ebing, 1886/1965).

⁵*Hebephilia* is the erotic interest in pubescent children (Glueck, 1955).

⁶*Teleiophilia* is the erotic interest in adults (Blanchard et al., 2000).

show higher rates of non-right-handedness, both before and after IQ is covaried (Cantor et al., 2004; Cantor, Blanchard, Robichaud, & Christensen, 2005); although lower IQs can plausibly produce a higher likelihood of being apprehended, higher rates of non-right-handedness (after controlling for IQ differences) cannot. Also arguing against the ascertainment bias explanation of the IQ findings is the meta-analytic comparison of pedophiles with men who committed only nonsexual crimes: The samples of sexual offenders against children showed significantly lower IQs (Cantor, Blanchard, et al., 2005). That is, the IQ difference still emerged, even when the comparison sample was ascertained because of their having committed a criminal offense.

If erotic age preference does relate to brain structure or function, it becomes important to etiological theories of pedo- and hebephilia to ascertain whether IQ testing captures the entirety of the neurological dysfunction among these men or whether these men demonstrate a more general behavioral deficit that is only partly reflected in IQ scores. It becomes of interest, therefore, whether deviant erotic age preference predicts other indicators of behavioral pathology.

Two such indicators of early developmental pathology are grade failure and identification as having special education needs during primary or secondary education. These situations are associated with several neurodevelopmentally relevant pathologies, including attention deficit/hyperactivity disorder (ADHD; e.g., Faraone et al., 1993; Place, Wilson, Martin, & Hulsmeier, 2000), learning disabilities (e.g., Barnett, Clarizio, & Payette, 1996; McLeskey & Grizzle, 1992), and premature birth or low birth weight (Buck, Msall, Schisterman, Lyon, & Rogers, 2000; Pinto-Martin et al., 2004), as well as mental retardation. Children may also be assigned to special education systems with diagnoses of conduct disorder or oppositional defiant disorder, which are themselves often comorbid with ADHD (e.g., Déry, Toupin, Pauzé, & Verlaan, 2004; Place et al., 2000). Increased special educational needs are also associated with indirect factors, such as low maternal education (e.g., Holloman, Dobbins, & Scott, 1998; Kochanek, Kabacoff, & Lipsitt, 1987), which might reflect either a genetic or a social transmission of poor academic performance.

Rates of grade failure and of special education enrollment in the general population have not remained constant. In the U.S., special education programs were instituted on a national level in the 1970s, and the numbers of students in such programs have been increasing; by the 1999–2000 school year, 11.3% of children aged 6–17 years were served by the Individuals with Disabilities Education Act (U.S. Department

of Education, 2002). Although Canada-wide statistics on special education services are not compiled, such data are available online for Ontario, the Canadian province in which the present investigation was conducted (<http://esip.edu.gov.on.ca/english/>; S. Ko, personal communication, November 25, 2005): 12% of elementary school students and 15% of secondary school students were receiving special education services in the 2003–2004 school year. On the basis of the 1995 Current Population Survey, the U.S. National Center for Education Statistics calculated that 13.3% of persons aged 16–24 had been retained in at least one grade (National Center for Education Statistics, 1997). Males are more likely to be retained than are females (for the males in that age range, the rate was 16.9%; for females, 9.6%). Although the equivalent national statistic is not available for Canada, the Canadian National Longitudinal Survey of Children and Youth provides the rates of grade repetition for a large ($N = 22,831$) and representative sample of children aged 8–11 years living in Canada; in that sample, 8.1% of the males and 5.8% of the females had repeated a grade by age 11 (Offord & Lipman, 1996). The rates of these events are higher still in clinical samples. Of males with ADHD, approximately 20% have repeated a grade, and 25% have been placed in special education classes (e.g., Faraone et al., 1993); one-third of the ADHD group in the Faraone et al. study were in one or both of those situations.

To ascertain whether erotic age preference related to histories of poor school performance, we compared histories of grade failure and special education class placement in groups of men diagnosed as pedophilic, hebephilic, or teleiophilic according to their phallometric test results, sexual offense histories, and admitted erotic interests. Because persons who failed school grades or who required special education programs have lower IQs than those who did not, and because pedophilic and hebephilic men have lower IQs on average than do teleiophilic men (Cantor et al., 2004; Cantor, Blanchard, et al., 2005), one would anticipate an association between the poor school histories and erotic age preference. We therefore tested IQ as a covariate that might potentially account for an association between school history and erotic age preference. Because an individual's likelihood of performing poorly in school is related to his parents' education levels, we also tested whether parental education level accounted for any association between school history and age preference.

Our earlier analysis of the IQs of the patients undergoing assessment in our facility considered all teleiophilic men as one group, regardless of whether they had committed a sexual offense or were undergoing assessment for nonforensic reasons (Cantor et al., 2004).

Because a larger quantity of clinical data has subsequently accumulated in our facility's database, we now have the opportunity to subdivide the teleiophilic group to conduct an additional comparison: By considering the teleiophilic sexual offenders separately from the teleiophilic nonoffenders, we can elucidate whether there are group differences associated with committing sexual offenses, in addition to any group differences associated with erotic age preference. If the indicators of poor educational performance reflect deviant erotic age preference, then the pedophilic and hebephilic groups will differ from the teleiophilic offenders, but the two teleiophilic groups will not differ from each other. If the indicators of poor educational performance reflect sexual interests in nonconsenting persons, then the teleiophilic offenders will differ from the teleiophilic nonoffenders.

METHOD

Participants

All study participants were recruited from the Kurt Freund Laboratory of the Centre for Addiction and Mental Health (Toronto, Ontario, Canada), which provides evaluation services to male patients referred as a result of illegal or clinically significant sexual behaviors or interests. The primary source of referrals to the facility is parole and probation officers, with physicians and lawyers providing others. As detailed in the following, the standard assessment at the Laboratory consists of a psychophysiological (phallometric) assessment of the patients' erotic preferences, a semi-structured interview of their sexual history and interests, a review of supplementary psychiatric and legal documents supplied by the referral source, and a brief neuropsychological evaluation that includes the patients' academic history. Upon the completion of his evaluation, each patient was asked to permit his clinical data to be used for research purposes.

The files of 713 consecutive patients of the Kurt Freund Laboratory contained sufficient information for the present analyses and were classifiable into one of the four groups by the criteria stated later. Twelve of these patients did not provide consent for the use of their clinical data for research purposes; such cases represented 1–2% of each study group. All the analyses to follow pertain to the remaining 701 cases. All patients underwent assessment between March 3, 2000 (when the Laboratory began recording the last of the relevant variables) and April 20, 2005 (when data collection for the investigation ended). The sample had a mean age of 38.1 years ($SD = 13.2$). The mean number of years of education completed

was 11.7 ($SD = 2.8$); the median was high school graduation. The patients were predominantly of European descent, with 79.7% describing themselves as White, 2.1% as Asian, 6.8% as Black, 3.7% as Southeast Asian, 1.4% as Aboriginal Canadian, 1.0% as Filipino or Pacific Islander, and 4.7% as "other," which included mixed ancestry. For three patients (0.4%), this information was unknown.

Of the entire sample, 41.7% were known to have committed a sexual offense against one or more victims aged 11 years or less, 22.8% against one or more victims aged 12–14, 11.3% against one or more victims aged 15–16, and 34.5% against one or more victims aged 17 or more; 20.4% of the sample had no known victims of any sexual offenses. These latter patients received assessments following charges of possession of child pornography or because of the patient's concern regarding his own sexual urges, etc. The characteristics of the victims of 14 (2.0%) patients were not yet verifiable by court or other documentation at the time of the present investigation, but the patients were nonetheless classifiable for the following analyses on the basis of their phallometric test results or their self-reported sexual interests. The sum of these percentages exceeded 100% because of some patients having victims in more than one age category. In the following analyses, no distinction was made between intrafamilial offenses (i.e., incest offenses) and extrafamilial offenses.

Measures

Phallometric Measurement of Erotic Gender-Age Preferences

Blanchard, Klassen, Dickey, Kuban, and Blak (2001) described the phallometric procedure and data handling technique in detail. Briefly, a computer records an examinee's penile blood volume while the examinee observes a standardized set of stimuli that depict a variety of activities and persons of potential erotic interest to the examinee. Change in the examinee's penile blood volume (i.e., his degree of penile erection) indicates his relative erotic interest in each class of stimuli. Clinicians and researchers employ phallometry to quantify the erotic interests of sexual offenders against children (e.g., Howes, 1995), and meta-analytic review of 61 studies indicated that phallometric test results represented the single most reliable predictor of which men will commit additional sexual offenses after their release into society (Hanson & Bussière, 1998). The specific phallometric protocol in use at the Kurt Freund Laboratory over the course

of the present investigation has already been shown to distinguish pedophilic from teleiophilic men (Blanchard et al., 2001).

The stimuli used in the phallometric test were audiotaped narratives presented through headphones and accompanied by slides. There were seven categories of narratives. They described sexual interactions with either female children, female pubescents, female adults, male children, male pubescents, or male adults, or erotically neutral (i.e., solitary and nonsexual) activities. The accompanying slides depicted nude models corresponding in age and sex to the topic of the narrative. The neutral narratives were accompanied by slides of landscapes. The data reduction process, also outlined by Blanchard et al. (2001), yielded seven category scores, one to reflect each of the six combinations of the age group and sex of the stimuli, plus the neutral category.

Sexual Offense History and Self-Reported Erotic Interests

A standardized form was used by the phallometric laboratory staff to record each patient's history of sexual offenses. The coding of this information included each patient's numbers of victims aged 11 or less, victims aged 12–14, victims aged 15–16, and victims aged 17 or more. The information came primarily from documents that accompanied the patient's referral, such as reports from police, probation, or parole officers. Some patients themselves reported additional information regarding offenses that were not included in their files and for which they had not been charged. During patients' sexological assessment, they were asked to rate their own erotic interests in females of six age categories (17 years or older, 15–16 years, 12–14 years, 11 years, 6–10 years, and 5 years or younger) and again, for males in the same six age categories. The patient rated each category on a Likert scale from 1 (*strongest erotic interest*) to 5 (*least erotic interest*).

Neuropsychological Assessment and History

Study participants underwent a brief interview regarding relevant neuropsychological history and, to permit an estimation of each patient's level of intellectual functioning, IQ testing with a six subtest short-form of the WAIS-R (Information, Similarities, Digit Span, Arithmetic, Picture Completion, and Block Design). Full-scale IQ scores were estimated from the age-scaled subtest scores by the method detailed by Tellegen and Briggs

(1967), using the intercorrelations among those subtests in the WAIS-R standardization sample.

During the neuropsychological history-taking, each participant was asked whether he had ever repeated a grade in school (coded 0 for "no" and 1 for "yes") and whether he had ever been enrolled in any special education classes (coded 0 for "no" and 1 for "yes"). Grades repeated because of relocation to a new school system or because of nonacademic reasons (such as transferring from a French-language school to an English-language school in the Canadian educational system) were coded as 0. Enrollment in special education classes for gifted students was coded as 0.

Our prior analyses of IQ in this population (Cantor et al., 2004) covaried patients' ages and the ages at which they immigrated to an English-speaking country. Thus, to maintain consistency in statistical technique and to control for the decrease in IQ estimates potentially produced by undergoing a test conducted in one's nonnative language, these variables were covaried here. The patient's age on the day of testing and his age at immigration were recorded from the patient's self-report during his interview by the clinician conducting the neuropsychological assessment. Speaking English as a first language was coded as "0."

To control, as much as possible, for the aforementioned association between scholastic history and parental education level, the education levels of patients' mothers and fathers were also covaried. Each patient provided his parents' education levels on a questionnaire of demographic information that each patient completed on the day of his phallometric assessment. For the relevant items—*What was your father's [mother's] education?*—the patient checked a box with one of the following responses and corresponding code numbers: "less than Grade 8": 1; "Grade 8": 2; "Grade 9–11": 3; "high school graduation": 4; "business, trade, secretarial school, etc.": 5; "community college—currently attending or completed diploma": 6; "university—currently attending or completed bachelor's degree": 7; and "graduate or professional school (M.A., Ph.D., M.D., etc.)—currently attending or completed degree": 8. Some patients did not know the education levels of one or both parents; this would occur in situations such as when a patient was raised by someone other than his parent. Eighty-nine patients did not know their mother's education level, and 142 did not know their father's. We handled this situation with a two-step procedure, as recommended by Cohen and Cohen (1983, pp. 284–300): First, a new predictor variable (i.e., independent variable) was created with a value of "1" to represent cases for which the relevant data were missing, and "0" for all the others (i.e., a *missing data dichotomy* was created, p. 285). Second, the missing values on the

original predictor variable were replaced with a constant, in this case, the grand mean from all cases with known data. In regression (the statistical method to be employed in the analyses to follow), the standardized regression coefficient associated with the missing data dichotomy represents to what extent the cases with missing values differed from the cases with observed values on the criterion variable (i.e., the dependent variable). This method has the advantage of capturing all the available sample information and maximizing statistical power.

Group Assignment

Patients were divided into four discrete groups for data analysis: pedophiles, hebephiles, teleiophilic sexual offenders, and teleiophilic nonoffenders. Patients were classified as pedophilic, hebephilic, or teleiophilic using the same criteria we applied in our analyses of IQ of our patients (Cantor et al., 2004). Specifically, a patient was classified as pedophilic if he responded more to a prepubescent child category than to any other gender-age category on the phallometric test (i.e., he responded more to either the prepubescent males or the prepubescent females than to the pubescent or adult males or females). If the patient lacked a valid phallometric test, he was categorized as having pedophilia if he admitted to greater sexual attraction to prepubescent boys or girls than to any other gender-age category. A patient was categorized as hebephilic by the analogous criteria regarding pubescent, rather than prepubescent, children.

Because teleiophilia is the most desirable classification both socially and in the courtroom, many pedophilic or hebephilic patients endeavor to achieve it in interviews and on phallometric testing (see Blanchard et al., 2001). Thus, the classification of a patient in one of the teleiophilic groups was made more stringent by the addition of a second criterion: The first criterion was analogous to that for the pedophilic and hebephilic categories—a greater response to adult males or adult females than to any other category on the phallometric test, or (lacking a valid phallometric test) the patient stated that he was more attracted to persons past their 17th birthday than to younger persons. The second criterion was that the patient lacked any history that might contradict his phallometric results or self-report (i.e., he lacked any known offenses against male or female victims under age 17, and he had never been charged for or admitted to possessing child pornography). Men who were teleiophilic by these criteria were classified as teleiophilic offenders if they had committed any sexual offense (against an adult), such as indecent exposure or sexual assault. Teleiophilic

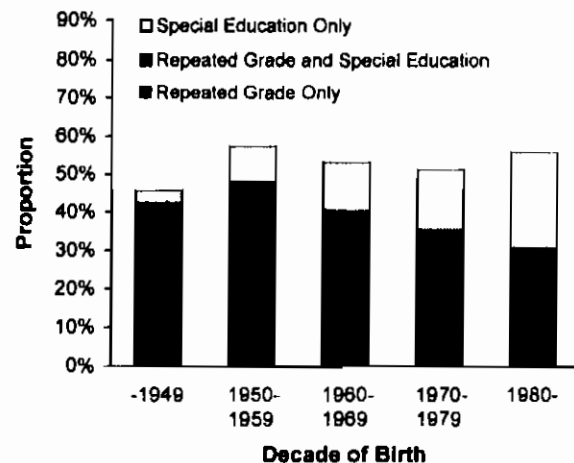


Fig. 1. Proportions of study participants who failed a school grade, who were enrolled in special education classes, and proportions who fit either criterion, all by decade of birth: 1949 or earlier ($n = 116$), 1950–1959 ($n = 136$), 1960–1969 ($n = 192$), 1970–1979 ($n = 162$), 1980–1989 ($n = 95$). See text for results of statistical analyses.

men with no known sexual offenses were classified as teleiophilic nonoffenders; such general sexology patients undergo assessment at the Kurt Freund Laboratory for other sexological concerns, such as sexual orientation issues and so-called sexual addictions.

RESULTS

Figure 1 shows the proportions of all study participants who reported ever repeating a grade in school and the proportions who reported ever being enrolled in a special education class, both by the decade in which the participant was born. These data reflect the change over time in how education systems handled students with low academic achievement. Logistic regression of each school performance variable onto decade of birth showed that, whereas rates of grade failure significantly decreased over time, $\chi^2(1, n = 701) = 6.38, p = .012$, the rates of special education class assignment increased, $\chi^2(1, n = 701) = 39.5, p < .0001$. To prevent this pattern from obscuring any group differences, the two events were collapsed into a single variable, representing whether a patient failed a grade or was enrolled in a special education class (or both). There was no significant change over time on this compound variable, $\chi^2(1, n = 701) = 0.63, ns$ (Fig. 1).

The proportions of each of the four groups who failed a grade or were enrolled in special education appear in Fig. 2. Pedophilic men were the most likely to do so (61.4%), and the teleiophilic nonoffenders were the least

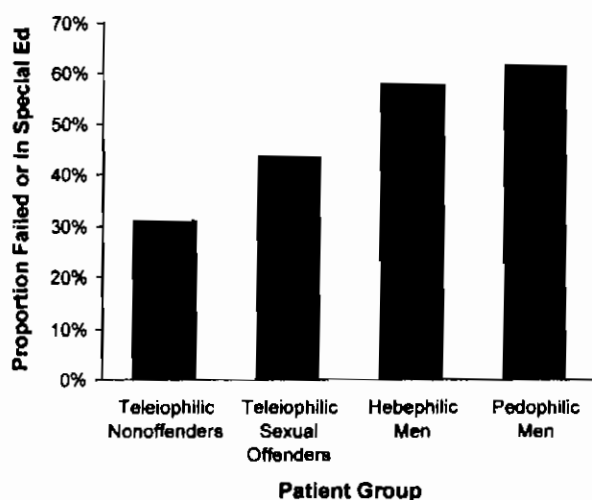


Fig. 2. Proportions of study participants who failed a school grade, were enrolled in special education classes, or both, by group membership. Groups represent teleiophilic nonoffenders ($n = 71$), teleiophilic sexual offenders ($n = 139$), hebephiles ($n = 377$), and pedophiles ($n = 114$). See Table 1 for results of statistical analysis.

likely (31.0%). Logistic regression showed that academic history was significantly associated with group membership, $\chi^2(3, n = 701) = 25.82, p = .00001$. Indicator coding of that model, with the teleiophilic offenders as the reference category, revealed that the odds of poor academic history were significantly greater both in the hebephilic group and in the pedophilic group (Model 1 of Table I). The difference between the teleiophilic offenders and the teleiophilic nonoffenders was not significant.

To test whether IQ accounted for the association between school performance and erotic age preference, three covariates were then added to the model: estimated full-scale IQ, age at assessment, and age at immigrating to an English-speaking country (coded as 0 for native English speakers). Although IQ was the variable of interest, age at testing and age at learning English can influence IQ scores; thus, these three variables were considered as a single set. This block of variables added significantly to the model, $\chi^2(3, n = 701) = 83.20, p < .00001$, and the overall model remained significant, $\chi^2(6, n = 701) = 109.01, p < .00001$. As one would anticipate, IQ highly significantly predicted patients' odds of failing a grade or being enrolled in special education (see Model 2 of Table I). The association did not, however, account for the association between school performance and erotic age preference, which changed very little.

Finally, to test whether parental education accounted for these associations, the remaining covariates were added to the equation: maternal education, paternal edu-

cation, and the aforementioned missing data dichotomies, one each for the two parental education variables. This block of four variables also added significantly to the model, $\chi^2(4, n = 701) = 11.71, p = .02$, and the overall model remained significant, $\chi^2(10, n = 701) = 120.72, p < .00001$. Neither of the two missing data dichotomy variables was significant (see Model 3 of Table I), indicating that, in this regression model, patients' odds of grade failure or special education placement were not significantly different for patients who did versus did not know their parents' education levels. The education level of patients' fathers, but not their mothers, contributed unique variance to the prediction of whether the patients performed poorly in school, with greater paternal education levels predicting lesser likelihood of a patient failing a grade or having been in special education. Once again, both the hebephilic group and the pedophilic group had significantly greater odds of poor academic history than did the teleiophilic offenders, and no significant difference emerged between the teleiophilic offenders and teleiophilic nonoffenders.

Thus, IQ, age at learning English, and father's education all contributed additional unique variance to whether patients failed a grade or were enrolled in special education; however, none of these contributors accounted for the association between patients' erotic age preference and their educational history. The odds of a pedophilic or hebephilic patient failing a grade or being enrolled in special education remained approximately double the odds of a teleiophilic sex offender doing so.

DISCUSSION

The between-groups comparisons presented here indicated that pedophilic and hebephilic men had approximately twice the odds of failing grades or requiring special education, relative to teleiophilic sexual offenders. Although estimated IQ, age at immigration to an English-speaking country, and paternal education level also contributed significantly to predicting poor school performance, they did not account for the association between educational history and erotic age preference. In absolute terms, the four groups studied here showed rates of scholastic grade failure or special education placement of approximately 30–60%. These proportions are much higher than that of the general population; they are instead comparable to the rates reported for certain clinical samples, such as those with ADHD (19–21% repeat a grade and 25–45% enroll in special education; Biederman et al., 2004; Faraone et al., 1993) or learning

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Table 1. Logistic Regression of School Performance onto Offender Status

Predictor	<i>B</i>	<i>SE_B</i>	Wald statistic	Odds ratio <i>e^B</i>	CI of odds ratio	<i>p</i>
Model 1						
Group assignment			24.53			.00002
Teleiophilic offenders vs. teleiophilic nonoffenders	-0.53	0.31	2.90	0.59	0.32-1.08	.088
Teleiophilic offenders vs. hebephiles	0.58	0.20	8.37	1.79	1.21-2.65	.004
Teleiophilic offenders vs. pedophiles	0.74	0.26	8.24	2.10	1.26-3.47	.004
Model 2						
Group assignment			19.49			.0002
Teleiophilic offenders vs. teleiophilic nonoffenders	-0.34	0.32	1.09	0.71	0.37-1.35	<i>ns</i>
Teleiophilic offenders vs. hebephiles	0.66	0.22	9.32	1.94	1.27-2.97	.002
Teleiophilic offenders vs. pedophiles	0.67	0.28	5.77	1.95	1.13-3.37	.016
IQ	-0.04	0.01	49.58	0.96	0.95-0.97	< .00001
Age at assessment	0.01	0.01	0.93	1.01	0.99-1.02	<i>ns</i>
Age at immigration to English-speaking country	-0.07	0.01	38.61	0.93	0.91-0.95	< .00001
Model 3						
Group assignment			16.72			.001
Teleiophilic offenders vs. teleiophilic nonoffenders	-0.30	0.33	0.80	0.74	0.39-1.43	<i>ns</i>
Teleiophilic offenders vs. hebephiles	0.64	0.22	8.35	1.89	1.23-2.91	.004
Teleiophilic offenders vs. pedophiles	0.64	0.28	5.09	1.89	1.09-3.28	.024
IQ	-0.04	0.01	40.29	0.96	0.95-0.97	< .00001
Age at assessment	0.00	0.01	0.01	1.00	0.99-1.02	<i>ns</i>
Age at immigration to English-speaking country	-0.07	0.01	34.69	0.93	0.91-0.95	< .00001
Mother's education (missing data dichotomy)	-0.15	0.35	0.19	0.86	0.43-1.70	<i>ns</i>
Mother's education	0.01	0.06	0.01	1.01	0.89-1.14	<i>ns</i>
Father's education (missing data dichotomy)	0.23	0.29	0.66	1.26	0.72-2.21	<i>ns</i>
Father's education	-0.16	0.06	7.74	0.85	0.76-0.95	.005

Note. *N* = 701; *SE_B*: standard error of the regression coefficient; CI: 95% confidence interval.

disabilities (58-72% repeat a grade; Barnett et al., 1996; McLeskey & Grizzle, 1992).

Our previous analyses demonstrated that a contemporary indicator of cognitive ability (performance on an IQ test administered in patients' adulthood) successfully distinguished between groups that differed in their erotic age preferences (Cantor et al., 2004; Cantor, Blanchard, et al., 2005). The present analyses demonstrated that an historical indicator of cognitive ability (scholastic performance during patients' childhoods and adolescence) also distinguished successfully between those groups. Thus, the present analyses suggest that at least some etiological component of the development of the erotic age preferences of males is active during or before school-age years.

The scholastic histories of the present sample were obtained by self-report and may be affected by recall error or willful manipulation on the part of the study

participants. Although examining school records directly would produce a more objective measure of poor school performance—at least, for the subset of patients for whom such records could be obtained—there was no observable evidence to suggest that self-report produced the present findings. First, to produce a spurious group difference, recall errors would have to relate systematically to group membership, and there is little basis on which to hypothesize that pedophilic and hebephilic men would overreport school problems but that teleiophilic sexual offenders would not. Attempts on the part of patients to “fake good” would reduce reported rates of school problems; however, the reported rates in all groups were much higher than those of the general population. Thus, such a willful effort did not produce the present findings. Another potential systematic error could be introduced by a person being more likely to forget an event the more time that has passed since the event; that is, older patients could be more likely

to forget that they failed a grade than are younger patients who are closer in age to their school ages. Patients' ages were included in the regression models, however, and no significant association between age and school history emerged in any analysis. Nonsystematic reporting errors, that is, random reporting errors, do not produce spurious group differences; they increase variance and thereby decrease the power available to detect underlying group differences. Thus, the group differences observed here would have emerged despite—not because of—random reporting error. Finally, although the school performance data were gathered by retrospective self-report, the present data demonstrated the same properties as reported by investigators who coded such data directly from school records: In the present sample, poor school performance was associated with lower IQ and lower parental (in this case, paternal) education level, and the rates of both grade failure and special education placement changed systematically over time. For these reasons, the present findings do not appear to be attributable to having been gathered by retrospective self-report.

The present findings indicate that any etiological theory of pedo- and hebephilia that asserts that such disorders begin in adulthood is, at best, incomplete. If deviant erotic age preferences were solely the result of an event (or events) occurring in adulthood (regardless of whether those events are neurological), then groups of teleiophilic men would not differ from groups of pedophilic or hebephilic men on any characteristic that predated that event. The poorer scholastic histories of pedo- and hebephilic men relative to teleiophilic sexual offenders is, however, consistent with the hypothesis we previously published, namely, that deviant erotic age preferences result from a perturbation of neurodevelopment occurring pre- or perinatally (Blanchard et al., 2002). That is, some deviation from normal neurodevelopment early in life prevents the development both of an erotic age preference for adults and of normal cognitive ability. This hypothesis would suggest that, whereas the age preference is not clearly exhibited—or, at least, not detected—until later in life, the cognitive sequelae are apparent at least as early as the school age years.

Considered by themselves, these data do not speak to whether pedo- and hebephilic men experienced scholastic difficulties because of having poorer cognitive abilities or because of experiencing emotional or other difficulties during their school ages. Both estimated IQ score and parental education level (which largely reflects the socioeconomic status of the patients' family of origin) related significantly to the odds of failing a grade or being enrolled in special education, but neither accounted for the association between the school record and group

membership. Considered together with the other reliably detected correlates of erotic age orientation, however—IQs (Cantor et al., 2004; Cantor, Blanchard, et al., 2005), rates of non-right-handedness (Cantor et al., 2004; Cantor, Klassen, et al., 2005), and histories of having suffered head injuries causing unconsciousness (Blanchard et al., 2002, 2003)—the present results appear to contribute to the emerging pattern that pedophilic and hebephilic men have suffered some perturbation of neurodevelopment that gave rise to these symptoms as well as the deviant erotic age preference.

The teleiophilic sexual offenders in the present sample did not differ significantly from the teleiophilic nonoffenders. This suggests that scholastic history did not reflect a general propensity to commit a sexual crime and instead reflected erotic age preference with some specificity. The hypothesis that scholastic history reflects general sexual criminality would predict the teleiophilic offenders to have scholastic histories that were poorer than those of the teleiophilic nonoffenders but no different from those of the pedophilic or the hebephilic men. Although one might plausibly attribute the lack of a significant difference between the teleiophilic offenders and teleiophilic nonoffenders to a lack of statistical power (the teleiophilic nonoffender group was smaller than the other three groups), the hypothesis can provide no obvious explanation for the significant difference between the teleiophilic offenders and the pedophilic and hebephilic groups.

These data do not, by themselves, let us rule out the possibility that poor scholastic performance is associated with paraphilic interests in general, rather than with pedophilic and hebephilic interests specifically. Both the teleiophilic offender and the teleiophilic nonoffender groups probably included some men who were not paraphilic and whose sexual behaviors had some other motivation. Thus, it is possible that the two teleiophilic groups had superior scholastic records because they were less likely paraphilic rather than less likely pedophilic.

The present results offer some suggestions for future research. First, we observed systematic changes both in the rates of school failure and (a seemingly compensatory change) in special education placement. Thus, future investigation should include some mechanism for compensating for cohort differences in scholastic records. Second, in the present investigation, we systematically recorded only whether patients failed any grade(s) or whether they were enrolled in special education classes. Recording which grade(s) the individuals failed or during which grade the individuals were diverted into a special education program could provide additional relevant

information. That is, it would be of potential etiological significance to ascertain whether scholastic difficulties emerge during early childhood and primary education or during adolescence and secondary education.

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EXHIBIT E

Handedness in Pedophilia and Hebephilia

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A sample of 404 adult men underwent assessment following illegal or clinically significant sexual behaviors or interests. Patients' assessments included: administration of a modified version of the Edinburgh Handedness Inventory; recording of patients' phallometric (penile) responses to erotic stimuli depicting adults, pubescent children, and prepubescent children of both sexes; and a tabulation of the numbers of patients' victims, ages 0–11, 12–14, 15–16, and 17 and older, of both sexes. In Study 1, patients' right-handedness scores correlated negatively with their phallometric responses to stimuli depicting prepubescent children and positively with stimuli depicting adults, replicating the pattern described in a previous report (Cantor et al., 2004). Unlike the previous study, however, patients' handedness scores did not significantly correlate with their numbers of prepubescent victims. To explore this discrepancy, Study 2 combined the patients from this replication sample with those in the previously reported sample, categorizing them by the sex and age group of greatest erotic interest to them. The odds of non-right-handedness in men offending predominantly against prepubescent children were approximately two-fold higher than that in men offending predominantly against adults and three-fold higher after eliminating those men with intrafamilial (i.e., incest) offenses. Handedness differences between men erotically interested in males versus females were not statistically significant. These results indicate that the rates of non-right-handedness in pedophilia are much larger than previously suggested and are comparable to the rates observed in pervasive developmental disorders, such as autism, suggesting a neurological component to the development of pedophilia and hebephilia.

KEY WORDS: handedness; laterality; neuropsychology; pedophilia; phallometry; sexual abuse; sex offenders.

INTRODUCTION

Men with primary erotic interests either for prepubescent children or pubescent children show poorer performance on intelligence and other neuropsychological tests than do men with a primary erotic interest for

adult sexual partners (e.g., Cantor et al., 2004). We refer to erotic interests for these age groups as *pedophilia* (von Krafft-Ebing, 1886/1965), *hebephilia* (Glueck, 1955), and *teleiophilia* (Blanchard, et al. 2000), respectively. Cognitive performance appears to relate more strongly to pedophilic and hebephilic interest than to the propensity to commit sexual offenses in general or to the propensity to commit offenses of a nonsexual nature. Unlike samples of men showing evidence of erotic interest in children, samples of sexual offenders against adults have not as consistently shown neuropsychological test scores lower than control groups or test norms (e.g., Quinsey, Arnold, & Pruesse, 1980; see also Blanchard, Cantor, & Robichaud, in press, for a review). Similarly, when compared with sexual offenders against children, men who have committed only nonsexual crimes typically score higher (e.g., Wormith, 1986).

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One possible explanation for the association between erotic interest in children and poorer cognitive ability is that they both reflect an underlying brain dysfunction, one that prevented the development of more typical intellectual and sexual characteristics, as we have previously proposed (Blanchard et al., 2002). Alternately possible is that the observed group differences on cognitive neuropsychological tests resulted from an ascertainment bias: Sexual offenders against children could be more likely to be apprehended if they have poorer cognitive abilities, and sexual offenders with greater cognitive abilities could be more likely to be well employed, to afford superior legal counsel, and to escape conviction (Blanchard et al., 2002; Cantor et al., 2004). Thus, sexual offenders against children might score lower on tests of intellectual function merely because such men are more likely to become available to research studies.

Developmental neuropathologies manifest in many cognitive and behavioral characteristics, one of which is an increased probability of non-right-handedness, and the evaluation of handedness comprises a standard component of neuropsychological assessment. Non-right-handedness occurs in approximately 8–15% of the general adult population (see Hardyck & Petrinovich, 1977 for a review), but 1.5–3.0 times more frequently in populations with any of several neurological disorders. Such disorders include Down's Syndrome (e.g., Batheja & McManus, 1985), epilepsy (e.g., Schachter et al., 1995), autism (e.g., Soper et al., 1986), learning disabilities and dyslexia (e.g., Cornish & McManus, 1996), and mental retardation (e.g., Grouios, Sakadami, Poderi, & Alevriadou, 1999).

The association of handedness with pedophilia and hebephilia can thus inform several issues regarding the etiology of erotic age preference. First, elevated rates of non-right-handedness would argue against the aforementioned ascertainment bias explanation of the poorer neuropsychological functioning among these men. Although it seems plausible to assert that men with poorer cognitive skills are more likely to be apprehended and convicted, it is much less plausible to posit that handedness would substantially affect rates of apprehension (over and above any effects of poor cognitive functioning itself). An elevated rate of non-right-handedness in pedo- and hebephilic men relative to that rate in teleiophilic men would instead suggest an association between erotic age preference and brain function. That is, non-right-handedness would be serving as a marker of an underlying neurological difference between teleiophilic and non-teleiophilic groups.

Researchers differentiate natural left-handers (who may have inherited an increased probability of sinistrality

from their parents) from *pathological* left-handers, for whom sinistrality resulted from a compensatory reaction of the developing brain to some trauma (e.g., Bishop, 1990). When one hemisphere of the brain suffers damage during development, the other may take on additional functions, including those expressed through handedness (Bakan, 1971; Bakan, Dibb, & Reed, 1973). Because one cerebral hemisphere (the left) achieves functional dominance in the great majority of humans, any perturbations sufficient to alter hemispheric dominance and equally likely to occur in either will exaggerate the frequency of the less common outcome (Satz, 1973). That is, changes in cerebral dominance from left-to-right will be much more common than changes in dominance from right-to-left because many more cases start out with dominance in the left hemisphere to begin with (for reviews, see Bishop, 1990; Coren & Halpern, 1991). This property permits elevated rates of sinistrality to denote perturbation(s) occurring during brain development.

Although elevated rates of non-right-handedness in pedo- and hebephilia would argue for a neurological contribution to the etiology of those conditions, it would also argue against any simple, focal-lesion model of that contribution. Some investigators have described case studies of individuals who suffered brain injury or disease in adulthood and subsequently engaged in sexual offenses, often against children (e.g., Mendez, Chow, Ringman, Twitchell, & Hinkin, 2000). Based on the characteristics of the lesions, some authors concluded that the sexually offending behaviors were the result of a specific, localized neuropathology (e.g., Casanova, Mannheim, & Kruesi, 2002). Elevated rates of non-right-handedness in large samples of pedophiles, however, would indicate that a neurological explanation of pedophilia based on specific brain sites is incomplete at best. Except for gross deficits in the motor control of the preferred hand, handedness does not change following brain injury in adults. Elevated levels of non-right-handedness are, however, associated with biological stresses occurring pre- and perinatally, achieving frequencies of non-right-handedness comparable to those in the aforementioned pervasive developmental disorders (e.g., Searleman, Cunningham, & Goodwin, 1988). Such pre- and perinatal stressors include premature birth (e.g., Marlow, Roberts, & Cooke, 1989; Ross, Lipper, & Auld, 1992), twinning and multiple births (e.g., Coren, 1994; Davis & Annett, 1994; Williams, Buss, & Eskenazi, 1992), and low birth weight (e.g., O'Callaghan et al., 1987; Powls, Botting, Cooke, & Marlow, 1996). Notably, three-fold increases in rates of non-right-handedness occur in some such samples even in the absence of any dramatic difference in the groups' mean IQs.

Two reports have suggested elevated rates of non-right-handedness in pedophilia, although neither report provided an adequate estimate of the actual proportion of pedophilic or hebephilic men who are non-right-handed. Bogaert (2001) reanalyzed handedness data archived by the Kinsey Institute for Sex, Gender, and Reproduction. A sample of men who had committed sexual offenses and a sample of men who had committed no known offenses had been asked by the Kinsey Institute researchers to indicate their handedness as right-handed, left-handed, ambidextrous, or left- and retrained to right-hand-use. Collapsing the non-right-handed responses together, Bogaert (2001) reported a small difference in non-right-handedness between the sample of controls (11.5% non-right-handed, $n = 4706$) and the subsample of sexual offenders whose victims included at least one extrafamilial (i.e., non-incest) child of either sex, age 11 or younger (15.7% non-right-handed, $n = 286$). This group difference achieved statistical significance prior to partialing out differences in the men's level of education ($e^B = 1.61$, $p = .030$), but less so after ($e^B = 1.66$, $p = .054$).

The Kinsey sample may have underestimated the actual rate of non-right-handedness in pedophilia. An unreported proportion of the sexual offenders against children also committed sexual offenses against adults, obfuscating those participants' erotic age preferences. Moreover, at least some sexual offenders against children are actually teleiophilic (e.g., Freund, Watson, & Dickey, 1991). The Kinsey database does not include results of objective tests of sexual interest, such as psychophysiological tests of penile responses to erotic stimuli (i.e., phallometry), which would have permitted verification of participants' erotic age preference. Thus, it remains unknown what proportion of that sample was actually pedophilic, and the inclusion of non-pedophiles in the sample of sexual offenders against children would have served to reduce the group differences observed.

Cantor et al. (2004) recorded from a large sample of sexually anomalous men: handedness on a nine-item inventory, phallometric responses to erotic stimuli involving either males or females in three age groups (adults, pubescent children, or prepubescent children), and the numbers of sexual victims and consenting sexual partners in each of several age groups (ages 17 or older, ages 15–16, ages 12–14, or ages 11 or younger). Study participants were undergoing assessment following either a sexual offense for which they were charged or atypical sexual interests for which they or their health care providers requested more information. Scores on the handedness inventory correlated significantly with the number of victims ages 11 or younger and with the magnitude of the genital response to stimuli depicting prepubescent

children. Greater non-right-handedness predicted more victims and a greater genital response, both before and after partialling out participants' estimated IQ scores and ages at testing.

In that report, however, we did not provide the actual proportion of its samples exhibiting non-right-handedness. This prevents direct comparison of its findings with those of the handedness literature. Moreover, although the association between handedness and the indicators of pedophilia achieved statistical significance, the magnitudes of the correlations were small, in absolute terms. The report drew no distinction between men who offended against their own children or step-children (i.e., intrafamilial offenders) and extrafamilial offenders; because intrafamilial offenders may be less likely to have genuine erotic interest in children (e.g., Freund et al., 1991), the inclusion of intrafamilial offenders might have decreased the magnitude of the association observed.

These findings therefore pose several questions: (1) because both Bogaert (2001) and Cantor et al. (2004) found handedness to correlate with pedophilia only modestly, the general determination of whether there exists an association between handedness and pedophilia bears repeating. (2) Because the sampling method of Bogaert (2001) could have included teleiophilic men in its sample of offenders against children, and because Cantor et al. (2004) did not provide handedness data in a dichotomous form, the actual proportions of non-right-handedness in conservatively diagnosed samples of pedophiles and hebephiles remain to be determined. (3) Whether there is an association of handedness with the sex of the victims also remains unknown. Bogaert (2001) collapsed offenders against female children with offenders against male children in his analysis, and Cantor et al. (2004) provided only equivocal results regarding this question. (4) Also unknown is whether the detection of an association of handedness with pedo- and hebephilia was hindered by the inclusion of intrafamilial offenders. The Bogaert (2001) sample excluded men whose offenses were limited to intrafamilial victims, but included men who had both intrafamilial and extrafamilial victims. The Cantor et al. (2004) sample collapsed into a single group men with either intrafamilial or extrafamilial victims.

We undertook Study 1 to address question (1), that is, to confirm our prior finding of an association between non-right-handedness and erotic age preference, using a non-overlapping sample of sexually atypical male patients that included individuals with pedophilic, hebephilic, or teleiophilic interests. Study 2, to follow, addressed questions (2)–(4). For each analysis, we adjusted for any extraneous effects on handedness from participants' chronological age and level of intellectual function.

Removing chronological age accounts for effects potentially introduced by the established association between handedness and age (e.g., Ashton, 1982; Porac, Coren, & Duncan, 1980); left-handedness appears to be related to shorter life expectancies (Coren & Halpern, 1991). Removing IQ accounts for the aforementioned association between increased rates of non-right-handedness and lower intelligence.

STUDY 1

Method

Participants

We recruited study participants from the Kurt Freund Laboratory at the Centre for Addiction and Mental Health (Toronto, Ontario, Canada), which provides evaluation services to male patients referred as a result of illegal or clinically significant sexual behaviors. The primary source of referrals to the facility was parole and probation officers, with some physicians and lawyers providing others. As detailed in the following, the standard assessment of the Laboratory consists of a psychophysiological (phallometric) assessment of the patients' erotic preferences, a semi-structured interview, a brief neuropsychological evaluation that includes handedness, and a review of supplementary psychiatric and legal documents supplied by the referral source. Upon the completion of his evaluation, each patient was invited to permit his clinical data to be used for research purposes.

The replication sample consisted of the 404 consecutive male patients of the Kurt Freund Laboratory who met the following inclusion/exclusion criteria and who completed assessment between February 1, 2002 and December 31, 2003. This time frame immediately followed that for the sample reported in Cantor et al. (2004). The replication sample excluded an additional 42 persons assessed in that time period who could not participate in the complete neuropsychological battery (because of deafness, insufficient English-language skills, etc.), who declined to consent to the use of their clinical results for research, or for whom there was no sexual behavior or interests information available other than self-report.

The sample showed mean and median ages of 37.7 years ($SD = 13.3$) and 38.0 years, respectively. The mean and median educational levels were 11.7 ($SD = 2.73$) and 12.0 years, respectively. The patients were predominantly of European descent, with 77.5% describing themselves as White, 2.5% as Asian, 7.4%

as Black, 4.0% as Southeast Asian, 3.0% as Aboriginal Canadian, 1.0% as Filipino or Pacific Islander, and 4.5% as "other," which included mixed ancestry. For one patient (0.2%), this information was unknown.

Of the replication sample, 47.8% committed a sexual offense against one or more victims ages 11 or under, 26.7% against one or more victims ages 12–14, 14.1% against one or more victims ages 15–16, and 30.4% against one or more victims ages 17 or over; 14.6% of the sample had no known victims of any sexual offenses. These latter patients received assessments following charges of possession of child pornography or because of the patient's concern regarding his own sexual interests, etc. The characteristics of the victims of additional 19 patients (4.7%) were not yet verified at the time of the present investigation and are included only in the phallometric analyses. The sum of these percentages exceeds 100% due to some offenders having victims in more than one age category. As in Cantor et al. (2004), no distinction was made in this analysis between intrafamilial offenses (i.e., incest offenses) and extrafamilial offenses.

Measures

Handedness. Patients indicated the hand they prefer to use (right, left, or no preference) for the following activities: writing, drawing, throwing, striking a match, opening a box, and using scissors, a toothbrush, a knife, and a spoon. This comprised a modified version of the Edinburgh Handedness Inventory (Oldfield, 1971; Williams, 1986). The arithmetic difference between the number of the "right" responses and the number of "left" responses, divided by the arithmetic sum of these two numbers yields the handedness quotient; that is, $\text{quotient}_{\text{handedness}} = (\text{right} - \text{left}) / (\text{right} + \text{left})$. To maximize the normality of the resulting J-shaped distribution, the handedness quotients were arcsin transformed, and then were reflected and inverted, as recommended by Tabachnick and Fidell (1989).

Phallometric Measurement of Erotic Gender-Age Preferences. Blanchard, Klassen, Dickey, Kuban, and Blak (2001) described the phallometric procedure and data handling technique in detail. Briefly, a computer records an examinee's penile blood volume while the examinee observes a standardized set of stimuli that depict a variety of activities and persons of potential erotic interest to the examinee. Changes in the examinee's penile blood volume (i.e., his degrees of penile erection) indicate his relative erotic interest in each class of stimuli. Clinicians and researchers employ phallometry to quantify the erotic

interests of sexual offenders against children (e.g., Howes, 1995), and meta-analytic review of 61 studies indicated that such procedures represented the single most reliable predictor of which men will commit additional sexual offenses after release into society (Hanson & Bussière, 1998). The specific protocol in use at the Kurt Freund Laboratory over the course of the present investigation reliably distinguishes pedophilic from teleiophilic men (Blanchard et al., 2001).

The stimuli used in the phallometric test were audiotaped narratives presented through headphones and accompanied by slides. There were seven categories of narratives. They describe sexual interactions with either female children, female pubescents, female adults, male children, male pubescents, or male adults, or erotically neutral (i.e., solitary, nonsexual) activities. The accompanying slides depicted nude models corresponding in age and sex to the topic of the narrative. Neutral narratives accompanied slides of landscapes.

The data reduction process yielded seven category scores, one to reflect each of the six combinations of the age group and sex of the stimuli, plus the neutral category. For the present investigation, three scores were of interest: the response to prepubescent children overall (i.e., the reaction to prepubescent male stimuli or to prepubescent female stimuli, whichever was greater), the response to pubescent children overall, and the response to adult stimuli overall. Subjects who did not produce a valid result on the phallometric test (e.g., those who did not respond to any category) were dropped from the phallometric analyses.

Sexual History. A standardized form was used by the phallometric laboratory staff to record each patient's history of sexual offenses. The information came primarily from documents that accompanied the patient's referral, such as reports from police, probation, or parole officers. Some patients reported additional information themselves, regarding offenses that were not included in their files and for which they had not been formally charged.

For the present analyses, four sexual history variables were of interest: the patient's numbers of victims ages 11 or under (regardless of their sex), victims ages 12–14 (regardless of their sex), victims ages 15–16 (regardless of their sex), and victims ages 17 or older (regardless of their sex). For the patients with any victims in a given age category, the modal number of victims was one; however, some patients had very many victims, producing highly skewed distributions. Moreover, some patients were only able to provide estimates of their numbers of victims, rather than precise quantities. Therefore, the scores on these variables were capped at 10.

IQ and Age at Testing. A six subtest short-form of the WAIS-R (Information, Similarities, Digit Span, Arithmetic, Picture Completion, and Block Design) permitted estimation of each patient's level of intellectual functioning. IQ scores were estimated from the age-scaled subtest scores by the method detailed by Tellegen and Briggs (1967), using the intercorrelations among those subtests in the WAIS-R standardization sample. Each participant's age was recorded as his age at his last birthday.

Results

The sample sizes varied in the following analyses due to missing data: Some patients failed to provide valid phallometric test results and appeared only in the sexual history analyses. Similarly, the forensic files of some patients had not been verified at the time of the present study, and these patients appeared only in the phallometric analyses.

Greater right-handedness was significantly associated with patients' greater age at testing, $r(402) = .112$, $p = .025$, two-tailed, and with higher IQ, $r(402) = .114$, $p = .022$, two-tailed, as consistent with the literature. Table I shows the partial correlations between the handedness quotients and the phallometric responses in the laboratory to each age category, and between the handedness quotients and the patients' numbers of victims in each age category. Each entry represents a partial correlation; that is, the effects of estimated IQ and age at testing already have been removed. To facilitate comparison, the table also includes the original results from Cantor et al. (2004) as well as the results from combining the samples.

These partial correlations were very close to the zero-order correlations of handedness quotient with phallometric responses and numbers of victims (i.e., the correlations before partialling out effects of IQ and age). Right-handedness scores correlated with phallometric responses to prepubescents, pubescents, and adults at $r_s(339) = -.161$, $.007$, and $.134$, $p_s = .003$, $.902$, and $.013$, respectively. Right-handedness did not correlate significantly with numbers of victims ages 11 or under, ages 12–14, ages 15–16, and ages 17 or older, $r_s(380) = .009$, $-.046$, $.057$, and $-.009$, $p_s = .867$, $.372$, $.264$, and $.860$, respectively.

Discussion

This replication sample demonstrated the same pattern of associations between handedness and phallometric

Table 1. Partial Correlations of Handedness with Phallometric Responses and Numbers of Victims

Indicator of erotic age preference	Sample		
	Original sample	Replication sample	Combined samples
Phallometric response	<i>n</i> = 377	<i>n</i> = 341	<i>n</i> = 718
Pedophilic stimuli	-.13*	-.16**	-.15***
Hebephilic stimuli	.04	-.00	.02
Teleiophilic stimuli	.07	.13*	.10*
Number of victims	<i>n</i> = 455	<i>n</i> = 384	<i>n</i> = 839
Ages 11 and under	-.13*	.01	-.07
Ages 12-14	-.04	-.05	-.04
Ages 15-16	-.06	.06	-.00
Ages 17 and older	.06	-.01	-.00

Note. Entries represent the partial correlations between handedness quotients on a modified version of the Edinburgh Handedness Inventory (Oldfield, 1971; Williams, 1986) and each phallometric age category or number of victims, with IQ and age at testing as covariates. Phallometric responses are quantified as ipsative *z* scores, based only on the patient's own data. Numbers of victims are capped at 10. Data for the original sample are from Cantor et al. (2004).

p* ≤ .05, two-tailed. *p* ≤ .005, two-tailed. ****p* ≤ .0005, two-tailed.

responses as did the original sample in Cantor et al. (2004). Phallometric responses to the youngest age category correlated negatively with handedness scores (indicating less right-handedness), and phallometric responses to the oldest age category correlated positively with handedness scores (indicating more right-handedness), the latter association being statistically significant in the replication sample only. For each of the replication, original, and combined samples, handedness correlated with the intermediate age category, hebephilia, at an intermediate level, not significantly different from zero. The lack of such a correlation, however, does not necessarily indicate that handedness is irrelevant to hebephilia. Rather, the uncorrelated scores may reflect the status of the hebephilic stimuli as an intermediate class among three ordinal and related characteristics. A man will show his greatest phallometric response to the class of stimuli that interest him the most and will show his second greatest response to the next closest age category. That is, a man most erotically interested in adults will show his greatest response to adults, but his second greatest responses to pubescents (Freund, 1967; Freund, Langevin, Cibiri, & Zajac, 1973). Similarly, men most erotically interested in children will react the most to children and show their second greatest responses to the next closest age category, in this case to pubescents, again (Freund, Langevin, Wescom, & Zajac, 1975). Thus, the magnitude of teleiophilic responses predicts greater right-handedness, and the magnitude of pedophilic responses predicts greater non-right-handedness, but the magnitude of hebephilic responses indiscriminately combines the secondary responses from both other types of men

together with those from men with genuine hebephilia, masking any underlying association. As a test of this possibility, samples of hebephilic men could be compared with independent samples of pedophilic and teleiophilic men. We explore this further in Study 2.

For neither the replication nor combined samples did patients' numbers of victims in any of the various age categories show any systematic association with handedness scores, unlike with their phallometric responses. Although phallometric response and sexual history both attempt to capture the same underlying construct—erotic age preference—sexual history may be more subject to misclassification. A man can sometimes suppress his phallometric responses during testing in controlled conditions, yielding an undifferentiating profile. Patients producing such profiles, however, are typically dropped from analysis, thus producing samples of demonstrably pedophilic men, demonstrably hebephilic men, and demonstrably teleiophilic men. Men unclassifiable by phallometric profile represent missing data for phallometric analysis, but still provide usable data for other analyses. Victim history data have the empirical advantage of not requiring the loss of the data from men who produce no valid phallometric profile, but suffer other disadvantages: (1) Victim history only reflects the victim history known to the researchers, and there may exist unknown victims in other age/sex categories unavailable to the categorization procedure applied to the victim history data. (2) Victim history can be influenced by the types of victims available to the offender and thus, again, fail to reflect his actual erotic preferences. This would be particularly true of men with a single (known) victim.

(3) Cantor et al. (2004) and the present analysis combined offenders with intrafamilial and extrafamilial victims, and intrafamilial offenders appear to be less likely to be genuinely pedophilic, as already mentioned. Assortment by phallometric response would separate teleiophilic offenders against intrafamilial children from pedophilic offenders against intrafamilial children; assortment by victim age group, however, would combine them. In his sample, Bogaert (2001) eliminated men who committed solely intrafamilial offenses; however, an intrafamilial offender would still have been included if he also had an extrafamilial victim. Thus, neither study included a sample of offenders against extrafamilial children only.

Given the reliability of the association between handedness and erotic age preference in general, we undertook Study 2 to answer questions (2)–(4) from the introduction. To identify any differences between patients most interested in male versus female victims and to identify any differences between patients most interested in prepubescent children versus pubescent children versus adults, men were assigned to non-overlapping groups, each representing one of the six combinations of the two sex and three age groups. Group assignments were carried out first using patients' phallometric test results to indicate their preferred category and again using the predominant sex and age group from the patients' actual victim history. The rates of non-right-handedness of each group appear as proportions to permit comparison of these proportions with those in the published literature. To determine whether the inclusion of intrafamilial offenders reduced group differences, analyses were repeated first including and then excluding patients who committed intrafamilial sexual offenses. To provide sufficient numbers of observations for reliable analyses of offender subtypes, these analyses combined the replication sample just described with the original sample first described in Cantor et al. (2004).

STUDY 2

Methods

Measures

Phallometric Group Assignment. Phallometric data were acquired as already described, and each patient received group assignment according to the stimulus category which elicited from him the greatest genital response: male adults, male pubescents, male children, female adults, female pubescents, or female children. That category provided the sex (male or female) and the age

group (children, pubescents, or adults) of greatest erotic interest to him. The analysis dropped patients who did not provide a valid phallometric profile.

Sexual History Group Assignment. The numbers of victims for which a patient was charged or for which he admitted contact were acquired as already described. Each patient was assigned to whichever sex and age group was his predominant victim type. In order to match the number of categories available to the phallometrically determined groups (six), the numbers of victims ages 12–14 and victims ages 15–16 were collapsed into a single variable representing the number of victims ages 12–16. The scores on this new variable were capped at 10, to maintain consistency with the other variables which were already capped at 10. Thus, each case was categorized according to his numbers of victims in six categories: females ages 17 or older, females ages 12–16, females ages 11 or younger, males ages 17 or older, males ages 12–16, and males ages 11 or younger.

We operationally defined *predominant victim type* conservatively. To be assigned to a category, a patient first had to have had more victims in that category than in any of the other five categories. This rule therefore had the additional and beneficial effect of removing from the analyses those patients whose preferred type of victim was indeterminate because of equal numbers of victims in more than one category. (Moreover, this rule dropped patients with zero victims, who necessarily would have the same, zero, number of victims in each category.) Although it is relatively intuitive that a patient with multiple victims of a particular sex and age group is erotically interested in such persons, it is not at all clear whether a patient with a *single* victim is most interested in that particular sex and age group. That is, some unknown number of men committing sexual offenses did so against a person not of their genuinely preferred sex and age category, and the risk of misclassification is greatest among men with single victims. To minimize such misclassifications, we therefore applied the additional criterion that the number of victims in the predominant category had to be greater than the number of victims in the next most frequent category *plus one*. Thus, for example, someone with victims numbering 1, 1, 3, 0, 0, and 0 across the six categories would be assigned to the group indicated by the category with three victims, but someone with victims numbering 1, 1, 2, 0, 0, and 0 or with victims numbering 0, 0, 0, 1, 0, and 0 would remain unassigned (and dropped from analysis), lacking a predominantly preferred category of victim.

Assignment to one of the categories (homosexual teleiophilia) required handling by an alternate method. The Kurt Freund Laboratory receives only very few cases

of persons with any sexual offenses against adult males. The Laboratory does, however, conduct assessments of non-criminal men seeking evaluation to help them identify their own sexual orientation as straight or gay men. Thus, a person was also classified as predominantly interested in adult males if his number of consenting, adult male sexual partners outnumbered his number of consenting, adult female sexual partners and if the patient had no sexual contacts after his 16th birthday with anyone who was both younger than 15 and more than 5 years younger than the patient.

The category to which each patient was assigned thus provided the sex (male or female) and the age group (children, pubescents, or adults) of greatest erotic interest to him. The numbers of intrafamilial and extrafamilial victims were recorded separately.

Handedness. Because the clinical database records patients' individual responses to each item on the Edinburgh Handedness Inventory, patients could be dichotomously categorized according to their response to the single item, "Which hand do you write with?" The following analyses classified cases as simply right-handed or non-right-handed; patients indicating no preference for writing hand were scored as non-right-handed.

IQ and Age at Testing. The IQ and age at most recent birthday were acquired as already described.

Data Analysis

Logistic regression provided the significance testing for the main effects of preferred sex of victim and preferred age group of victim on writing hand, both before and after entering IQ and age at testing as covariates. Analyses were conducted first with all cases classifiable with the preceding methods and again after eliminating cases who had any intrafamilial victims, to determine whether intrafamilial offenders masked underlying associations, as already described.

Results

Sorting the intrafamilial and extrafamilial offenders by the category of their greatest phallometric response classified 727 cases: 325 cases responded the most to female adults, 242 to female pubescents, 41 to female children, 38 to male adults, 40 to male pubescents, and 41 to male children.

Panel A of Fig. 1 indicates the proportions of each of these six categories who used their right hand for writing. The non-right-handedness rates of both of the teleiophilic categories—men who phallometrically respond the most to either adult women, 10.5%, or to adult men, 7.9%—

fell within the range of the general population. The men who responded the most to the pedophilic categories, however, showed non-right-handedness at approximately triple those rates. Logistic regression of writing hand onto the sex and the age group of cases' most preferred category indicated a significant association, $\chi^2(3, N = 727) = 15.07, p = .002$; the model adding IQ and age at testing as covariates was also significant, $\chi^2(5, N = 727) = 28.45, p = .00003$. Table II provides the logistic regression coefficients and their standard errors, the odds ratios and their 95% confidence intervals, the Wald statistics, and the reliability for each predictor and covariate. The age group, but not the sex, represented by each patient's foremost erotic interest significantly predicted the patient's handedness. Although both the pedophilic and hebephilic samples showed higher rates of non-right-handedness than the teleiophilic sample, only the pedophilic sample was significantly so.

The criteria already described for sorting cases by predominant victim type classified 295 cases: 101 cases were most erotically interested in female adults, 44 in female pubescents, 71 in female children, 19 in male adults, 22 in male pubescents, and 38 in male children. Panel B of Fig. 1 indicates the proportions of men in each category who use the right hand for writing. Although the profile of the proportions for each group somewhat resembled that from sorting by phallometric responses, the overall model was not significant, $\chi^2(3, N = 295) = 2.58, p = .46$. The model including the two covariates approached significance, $\chi^2(5, N = 295) = 10.03, p = .074$, but this reflected the association of handedness with the covariates, age and IQ (see Table III).

To determine whether the failure of sexual history to reveal any group differences was attributable, at least in part, to misclassifications of men with intrafamilial victims, the preceding categorizations and analyses were repeated, eliminating cases with any history of intrafamilial victims. Sorting only the extrafamilial offenders by phallometric responses now yielded 251 cases responding the most to female adults, 183 to female pubescents, 32 to female children, 28 to male adults, 37 to male pubescents, and 39 to male children. The removal of cases with any intrafamilial victims from the phallometrically derived categories produced virtually the same pattern of results as did the phallometrically derived categories that included intrafamilial offenders (cf., panels A and C of Fig. 1). Handedness significantly related to preferred category, $\chi^2(3, N = 570) = 8.89, p = .03$ and remained significant after the addition to the model of the two covariates, $\chi^2(5, N = 570) = 17.72, p = .003$. The age group of stimulus category was the most reliable predictor in each model (see Table IV).

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Table II. Logistic Regression of Writing Hand onto Sex and Age Group of Phallometric Category Eliciting Maximum Response

Predictor	<i>B</i>	<i>SE_B</i>	Wald statistic	Odds ratio (e^B)	CI of odds ratio	<i>p</i>
<i>Model one</i>						
Sex of category	0.33	0.32	1.11	1.40	0.75–2.60	.29
Age group of category			15.84			.0004
Adult vs. child	1.30	0.33	15.83	3.68	1.94–6.98	.00007
Adult vs. pubescent	0.39	0.24	2.53	1.47	0.91–2.37	.11
<i>Model two</i>						
Patient IQ	–0.01	0.01	2.91	0.99	0.97–1.00	.09
Patient age at testing	–0.03	0.01	8.28	0.98	0.96–0.99	.004
Sex of category	0.26	0.32	0.64	1.29	0.69–2.44	.43
Age group of category			14.25			.0008
Adult vs. child	1.26	0.34	14.25	3.54	1.84–6.81	.0002
Adult vs. pubescent	0.38	0.25	2.40	1.47	0.90–2.38	.12

Note. *N* = 727; *SE_B* = standard error of the regression coefficient; CI = 95% confidence interval.

Table III. Logistic Regression of Writing Hand onto Sex and Age Group of Predominant Victim Category

Predictor	<i>B</i>	<i>SE_B</i>	Wald statistic	Odds ratio (e^B)	CI of odds ratio	<i>p</i>
<i>Model one</i>						
Sex of category	0.00	0.39	0.00	1.00	0.46–2.16	1.00
Age group of category			2.36			.31
Adult vs. child	0.61	0.42	2.09	1.83	0.81–4.16	.15
Adult vs. pubescent	0.57	0.47	1.46	1.77	0.70–4.46	.23
<i>Model two</i>						
Patient IQ	–0.02	0.01	3.15	0.98	0.96–1.00	.08
Patient age at testing	–0.02	0.01	2.84	0.98	0.95–1.00	.09
Sex of category	–0.12	0.40	0.09	0.89	0.40–1.96	.77
Age group of category			2.83			.24
Adult vs. child	0.63	0.43	2.20	1.88	0.82–4.35	.14
Adult vs. pubescent	0.70	0.48	2.14	2.02	0.79–6.19	.14

Note. *N* = 295; *SE_B* = standard error of the regression coefficient; CI = 95% confidence interval.

Table IV. Logistic Regression of Writing Hand onto Sex and Age Group of Phallometric Category Eliciting Maximum Response—Excluding Patients with Intrafamilial Victims

Predictor	<i>B</i>	<i>SE_B</i>	Wald statistic	Odds ratio (e^B)	CI of odds ratio	<i>p</i>
<i>Model one</i>						
Sex of category	0.30	0.34	0.80	1.35	0.70–2.60	.37
Age group of category			9.20			.01
Adult vs. child	1.10	0.36	9.16	2.99	1.47–6.08	.002
Adult vs. pubescent	0.36	0.27	1.87	1.44	0.85–2.42	.17
<i>Model two</i>						
Patient IQ	–0.02	0.01	3.92	0.99	0.97–1.00	.048
Patient age at testing	–0.02	0.01	3.24	0.98	0.97–1.00	.07
Sex of category	0.19	0.34	0.32	1.21	0.62–2.37	.57
Age group of category			7.54			.02
Adult vs. child	1.01	0.37	7.52	2.75	1.34–5.66	.006
Adult vs. pubescent	0.33	0.27	1.50	1.39	0.82–2.36	.22

Note. *N* = 570; *SE_B* = standard error of the regression coefficient; CI = 95% confidence interval.

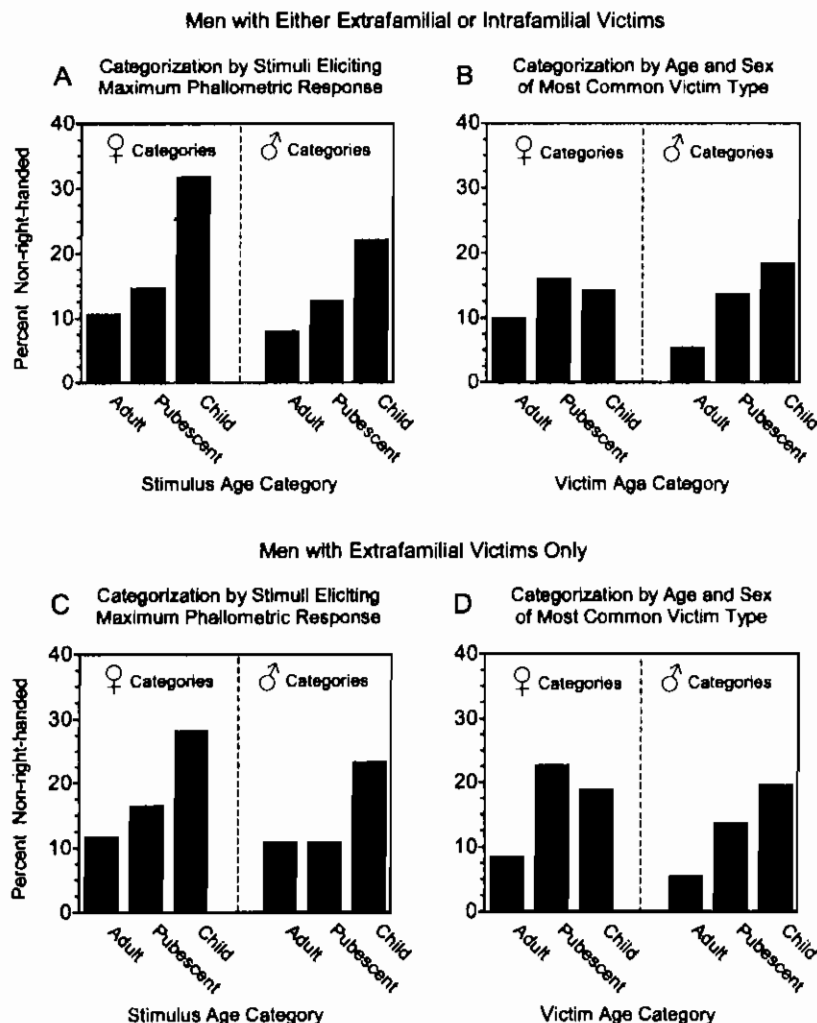


Fig. 1. Proportions of patients in each group who use the left hand for writing. The six groups represent the sex (female or male) and the age group (adult, pubescent child, or prepubescent child) of primary erotic interest to the patient. Panels A and B represent both extrafamilial and intrafamilial (i.e., incest) offenses; Panels C and D represent only those patients who committed extrafamilial and no intrafamilial offenses. For Panels A and C, patients were grouped according to the stimuli that elicited their greatest genital (phallometric) response. For Panels B and D, patients were grouped according to the sex and age group of their predominant victim type. See text for the exact classification procedures. Results of the logistic regressions of the handedness rates in Panels A–D appear in Tables II–V, respectively.

Re-applying the grouping criteria for sexual history after removing the cases with intrafamilial victims resulted in 96 patients most erotically interested in female adults, 31 in female pubescents, 48 in female children, 19 in male adults, 22 in male pubescents, and 31 in male children. After excluding intrafamilial offenders, the proportions of non-right-handedness among the six categories of extrafamilial offenders much more closely

resembled those shown by the phallometrically derived categories (cf., panels D, A, and C of Fig. 1). Logistic regression indicated that handedness related to the set of predictors after including IQ and chronological age, $\chi^2(5, N = 247) = 14.26, p = .01$, but only marginally so beforehand, $\chi^2(3, N = 247) = 7.06, p = .07$. Once again, the age group, but not the sex, of the categories significantly related to handedness (see Table V). In this

Table V. Logistic Regression of Writing Hand onto Sex and Age Group of Predominant Victim Category—Excluding Patients with Intrafamilial Victims

Predictor	<i>B</i>	<i>SE_B</i>	Wald statistic	Odds ratio (<i>e^B</i>)	CI of odds ratio	<i>p</i>
<i>Model one</i>						
Sex of category	0.26	0.42	0.39	1.30	0.57–2.96	.54
Age group of category			6.42			.04
Adult vs. child	1.07	0.46	5.45	2.93	1.19–7.21	.02
Adult vs. pubescent	1.07	0.50	4.51	2.92	1.09–7.85	.03
<i>Model two</i>						
Patient IQ	–0.03	0.01	5.17	0.97	0.95–1.00	.02
Patient age at testing	–0.01	0.02	0.82	0.99	0.96–1.02	.36
Sex of category	0.13	0.44	0.09	1.14	0.49–2.68	.76
Age group of category			6.37			.04
Adult vs. child	1.06	0.47	5.13	2.90	1.15–7.28	.02
Adult vs. pubescent	1.13	0.52	4.79	3.09	1.13–8.46	.03

Note. *N* = 247; *SE_B* = standard error of the regression coefficient; CI = 95% confidence interval.

analysis, both the pedophilic and the hebephilic samples differed significantly from the teleiophilic sample, showing odds of non-right-handedness approximately triple that of offenders against adults.

Discussion

These analyses confirmed the association between handedness and erotic age preference. Study 1 indicated that the procedures of Cantor et al. (2004) provided a reliable, albeit small, correlation between these characteristics. Study 2, using both the former and a new sample, indicated that the rate of non-right-handedness in pedophilic men was nearly triple that in teleiophilic men. With an odds ratio of approximately three, after accounting for group differences in IQ and chronological age, the association of pedophilia with handedness equals or exceeds that of several major neurological disorders, including Down's syndrome and autism. The elevated rates of non-right-handedness seem to be associated specifically with pedophilia and not with sexual offending in general; men who sexually offended against two or more female adults—and against no children—showed rates of non-right-handedness clearly within the range shown by the general population.

Before accounting for the covariates, the patients with erotic interest in males showed 1.30–1.40 greater odds of being non-right-handed than did patients with erotic interest in females (with the exception of the analyses shown in Table III). Although these odds ratios did not achieve statistical significance, they were very close both in direction and in magnitude to a prior meta-analytic comparison of heterosexual men with homosexual men

(all presumably teleiophilic), which found an odds ratio of 1.34, with male homosexuality showing greater odds of being non-right-handed before controlling for age (Lalumière, Blanchard, & Zucker, 2000). This suggests, therefore, not that hetero-/homosexuality is unrelated to handedness, but that the present sample did not have as much statistical power as did the meta-analysis to detect a difference of similar magnitude.

These data provided only partial evidence for a difference in rates of non-right-handedness between hebephilia and teleiophilia. Although the hebephilic sample scored midway between the pedophilic and teleiophilic samples in most analyses, the contrast between the hebe- and teleiophilic samples did not always achieve statistical significance, and neither phallometric responses to pubescents nor number of victims 12–14 nor 15–16 correlated with handedness scores. As already discussed, the correlations may reflect, not a lack of an association, but an association that becomes masked by responses to related erotic categories of stimulus. The rates of non-right-handedness among hebephilic men intermediate between the other groups is consistent with this interpretation. It would be worthwhile to repeat the group analyses with a sample of hebephiles and teleiophiles only.

The relative difficulty in identifying a significant handedness difference between hebephilic and teleiophilic groups may serve as a caution to future investigators. As used here, the age range of victims used to indicate hebephilia was 12–16, while the victim age range taken to indicate pedophilia was 0–11 years. Thus, one would expect increasing difficulty in detecting group differences in handedness (and, perhaps, in other characteristics) with increasing mean age of victims. That is, samples of sexual offenders against children may be less likely

to demonstrate group differences in handedness (and perhaps in other characteristics) when those samples include larger proportions of sexual offenders against older children.

The present results argue against IQ and chronological age as explanations of the association between handedness and erotic age preference, because the association remained significant after removing any effects of IQ and age. Societal efforts to change one's handedness can also be ruled out as an explanation. Efforts to alter handedness pertain to one type of change only: training natural left-handers to use their right hand. Such unidirectional efforts would serve to reduce any group differences in handedness. Thus, detection of a significant group difference in rates of non-right-handedness should be interpreted as having occurred despite any pressures to change handedness, rather than because of it.

The clinical data available for study did not permit any distinction between natural left-handedness and pathological left-handedness. Thus, for some unknown proportion of the present sample, left-handedness developed for reasons unrelated to any pathological process. The link between handedness and pedophilia suggests that pedophilic samples (and, possibly, the hebephilic samples) would contain an excess specifically of pathological left-handers and not natural left-handers. Conversely, the teleiophilic left-handers would be more likely to be natural rather than pathological left-handers. If true, then the better an investigation is able to distinguish pathological from natural left-handedness, the greater the group difference in handedness the investigation would detect. Some researchers have used the left-handedness of one or both of a patient's parents as a marker suggesting that the patient is more likely to have developed left-handedness from a normal, genetic route rather than from a pathological factor (e.g., Bradshaw-McAnulty, Hicks, & Kinsbourne, 1984); however, familial sinistrality can serve only as an approximation (see Bishop, 1990).

The three-fold increase in rate of non-right-handedness in pedophilia relative to that in teleiophilia detected here is consistent with hypotheses of a relationship between pedophilia and brain organization on par with other major neurological conditions. Although numerous psychosocial explanations of child molestation have been proffered (see Araj & Finkelhor, 1985 for a review), none predicts a group difference in handedness. Although there may exist psychosocial factors that contribute to the development or the expression of erotic age preference, any complete theory must account for, not only the differences in handedness, but also for the differences in other neuropsychologically relevant traits, including

lower mean IQs (e.g., Cantor et al., 2004) and increased frequencies of head injuries in childhood but not in adulthood (Blanchard et al., 2002, 2003). Research regarding psychosocial factors in pedophilia may advance more readily by pursuing data—not to reveal how psychosocial factors might cause pedophilia—but how psychosocial factors might interact with predisposing biological factors or how the psychosocial differences themselves reflect pre-existing biological differences.

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